American Machinist

A McGraw-Hill Publication. . . Established 1877

New York, February 13, 1930

*

Assaying the Export Market

By George R. Woods

Manager, R. S. Stokvis & Sons, Inc., Exporters

IN a previous number of *American Machinist* (Vol. 72, No. 4, p. 169) Mr. W. H. Rastall, chief of the Industrial Machinery Division, Bureau of Foreign and Domestic Commerce, presented an illuminating epitome of American sales accomplishments in export markets. As we scrutinize this evidence from Washington, let us follow the custom of an ancient race beyond the seas and read these figures backwards. Hidden behind the 1929 to 1919 totals, is a great deal more than meets the eye. From an aviator's seat, let us observe some markets across the water as they were in 1920.

That huge warehouse below is on a tributary of the Loire. From floor to roof it is filled with the new American machine tools. These tools will soon be offered not only in war-weary Europe but some will be shipped back to our own shores. Perhaps that taxicab now approaching the warehouse is carrying an American dealer searching for a distress bargain. Are there more such warehouses? Indeed there are, a great many. We shall see them in England, Belgium, Germany, and Japan. Ships loaded to their marks with cargoes of surplus war tools will also be seen bound for Sydney, Soerabaya, and Buenos Aires. Landing now beside our statistics we resume our studies remembering always that our friend, the machine tool dollar, is half the size he was in 1913.

The war years of 1913 to 1918 afford some interesting figures of no value whatever in a study of export growth. This war period we dismiss as an economic interregnum. For those interested there are numerous articles available covering these years. In general the writers claim that, had there been no war, the total machine tool exports from 1913 to 1929 would have been greater.

In the upward climb of machine tool exports we may regard the war as a convenient plateau. Surveying the years from 1900 to 1913. We see steady growth despite strenuous international competition. Compared with current export practice, these years seem almost primitive. The best interpretation of that time is a synchronous economic and engineering chart which readily suggests itself. The changes in the markets from 1900 to 1930 are as great as the changes in the tools themselves.

Thus we have blocked out these export figures into

three sections: 1900 to 1913, the period of introduction and serious development of machine tool exporting; 1914 to 1918, the war years; and the post-war readjustment period from 1919 to 1929. Several questions suggest themselves: Who did this export selling? How did they do it? What of the present? What of the future?

Though every profession and industry has its leaders the machine tool industry has been especially fortunate in possessing export pioneers who have done the expensive development work and have always been willing to assist fellow tool builders. These export pacemakers are the firms who, prior to the turn of the century, studied export fields with their own eyes. They evaluated export markets correctly, and many of them started then to make frequent trips to their more important territories. These firms, whose executives were often on the ground, soon developed sound sales policies. They were the first to meet the progressive local dealers and to make profitable sales alliances. Later, when they desired to have some of their own practical sales engineers reside abroad to assist their dealer organizations, the more far-seeing of these tool builders made it a practice to give a number of their men foreign experience. Today these firms have whole groups of men in their organizations who have lived abroad. Such men make their companies internationally minded, and such companies will continue to dominate the export sales of the future.

They can spend a minimum of time on export statistics. These firms with continuous first-hand export information would never make the mistake of the compressor manufacturer who sent a salesman to Japan because of a glowing statistical picture, only to discover that railway airbrakes were classified as compressors. Neither did these organizations relinquish their export activities during 1919 to 1929 because a post-war glut of tools had to be dissipated by a re-export business in new and reconditioned tools, an unexpected class of competition for them.

Moving ahead of the tool builders in the export field are their large domestic customers who have passed from international selling to international manufacturing. Not so long ago many tool builders could name the American companies with factories abroad. Today there are actually several hundred such organizations. (Enter here the necessity for a sales policy which will meet all the complications of a modern international transaction, where a specification originates in one country, is approved in another, and finally becomes an order in a third country. Fortunate the tool builder whose sales organization functions faultlessly in such buying procedure.)

Years ago only the largest companies saved cross freights on a national scale. Today relatively small concerns are saving cross freights on an international basis. A goodly number of foreign manufacturers have consulting engineers in New York or Detroit, one large French company maintaining an engineering and purchasing office in Detroit. How many tool builders have the requisite co-ordinated sales policy between their domestic and export forces to meet this situation?

Instances could be cited of current export sales problems which would confirm the following obvious conclusion. Since tremendous territorial compression has followed the transcending improvements in communication, and in all fields of transportation, why not consider the world as one market; adopt a broad sales program; vigorously support all arms of the selling division; maintain a firm and fixed price policy; and once and forever realize that selling in Oslo is very much the same as selling in Oswego? Even now the manufacturing regions of the world are growing towards an economic solidarity.

Set the dials on your combination television, and radio unit for the year 1950. See the world in perspective, with light flashes bringing into relief the features we have requested. The great trade routes of the world have shifted. Raw products move from the tropics toward the polar circles. Cargoes of manufactured goods travel toward the equator in exchange for food and raw materials. East and west traffic in the temperate zones is on an express schedule for light cargoes of highly perfected and refined products. World wide production control of all basic crops and materials has resulted in price control. All industries are grouped, and each group has its own banking system. Serious commodity panics are unknown.

The indicator light plays on a large building in each continent. These are the machine tool experimental and testing laboratories where almost every machine tool made is on display, with a complete record of performance on different kinds of work. Television and radio make it possible for buyers everywhere to see these machines without traveling. Sellers and buyers exchange their blue prints instantaneously, and discuss production programs while they watch demonstrations of various machines. All transportation elements have been integrated into world wide systems.

Now we turn the "question and answer dials" and ask for the watchword of this new era. Back comes the answer: specialize and co-operate. Continuing, the voice tells us that the poets' dream of engineering progress has been fulfilled: the master tools of industry "shall draw the rims of the world together."

For flights of fancy, let us now return to the present day; let us wander through the green meadows where export orders grow.

As we start, we must remember that the exportation of American capital in the past decade has been in terms of billions, whereas before the war, American capital in foreign countries could be mentioned only as "also present." Another beneficial factor has resulted from the recent exportation of American advertising brains. Numerous advertising agencies have been, for some time, international organizations. Our leading trade papers have most effectively projected their influence into the far corners of the world. The world wide coverage afforded by our large banking institutions, while almost an old story now, should be appreciated and utilized. Today, American industrial machinery, automotive equipment, and engineering methods are the vogue in many export markets.

For the experienced and veteran machine tool builder, the question of more export business is not so difficult. With his well established and vigorously supported agencies in the major export markets, he should participate in the natural growth of foreign countries. Perhaps something more could be done by him, by co-operating with trade papers, and by advertising to spread the gospel of replacing obsolete tools in these markets. Such a manufacturer could afford to spend real money each year to entrench himself in one or more minor markets. At least he could send a skilled sales engineer to visit such markets and could establish contacts with shops owned by the large international organizations whose headquarters are in various world centers. When this engineer calls on a purchasing office in New York, London, or Detroit and mentions his visit to that company's plantation in Sumatra, or oil fields in Venezuela, or railroad shop in San Salvador, he becomes almost "a member of the family" during the interview.

For the machine tool builder who has no well anchored sales connections in the major export markets, there is no alternative for a six months' sojourn in Europe. If his machine is a special or semi-special purpose tool, he should be able to find some old-line house in each country to sell for him. The agent should be fortified with knowledge and be as well grounded in the manufacturer's equipment as time will permit. One or two well established agents will mean more than a dozen nominal agents who simply look imposing when listed at the bottom of a trade paper advertisement. In brief, there is no substitute for hard work; and securing export business year in and year out is about the hardest kind of machine tool selling.

Specifically, let us consider a group of manufacturers who build the large and varied units required in shipyards, railroad shops, car and locomotive shops, etc., there being a number of American firms who have supplied complete plants of this nature. The more successful of these companies maintain all the necessary banking and engineering contacts in the United States, in case such projects should be initiated here. They have agents in many countries, correspondents or friendly intermediaries in others, and their own representatives in London, and sometimes other foreign cities as well. The less successful of these companies are usually late in hearing of new export business because they have never developed the requisite agency connections abroad. They are also handicapped because their intermittent export experience on large deals makes them less skillful and adroit negotiators.

Another group of builders who have an intermittent export business are those manufacturers of highly developed equipment which is virtually a complete manufacturing process. As possessors of a quasi-monopoly, such firms sometimes become too complacent about export business. These companies are so well known that they depend on export customers coming to them. Not infrequently such manufacturers are unable satisfactorily to adjust themselves to an export transaction, and enter into contracts which prove quite unprofitable, mainly because they were unfamiliar with their purchaser's practices, habits, and manufacturing procedures. A local agent in such a case could have made the deals move without friction.

Still another class of exporters, who have been decidedly successful, are the makers of shop specialties, such as highly developed pipe threaders, portable electric drills, etc. These firms are intense specialists, and with well established agencies in major markets, they are able to throw their field men into lesser markets where, in due time, their machines are bywords.

About ten years ago Captain Ross-Smith, an English army officer, made the first airplane flight from England to Australia. He damaged his plane while landing in the Malay Peninsula. He needed a small lathe to make necessary repairs, and found an old foot-operated tool on a plantation about twenty miles away. Today, he would find modern equipment, for the large English and Dutch aviation companies have their own modern repair stations on this route. This is typical of the changes wrought by the machine age in the tropics.

One of our popular national pastimes has recently made many of us familiar with the expression "long-pull." This assays and describes the export business.

The Fabrication and Assembly of

GOLDY SEALS

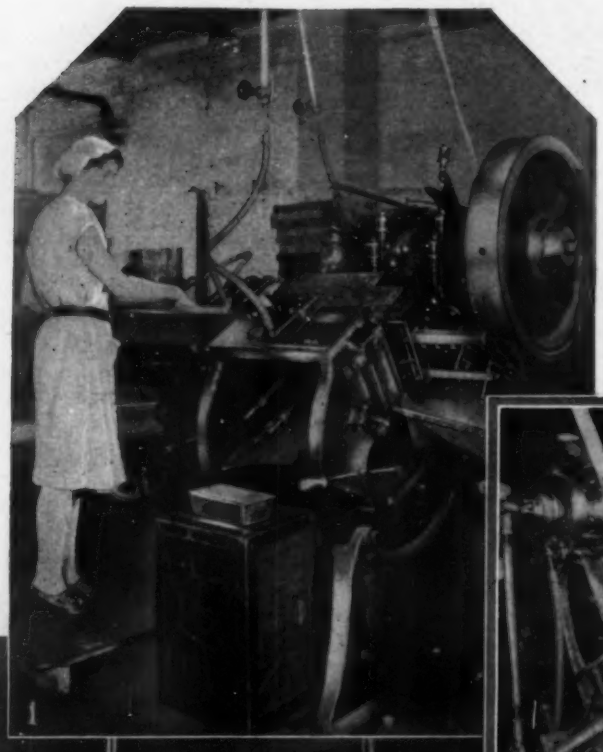


Fig. 1—An automatic strip-feed press, blanking and drawing lithographed capsules from pure aluminum sheet. This machine operates at a speed of 175 r.p.m. By using a triple die 525 capsules are produced per minute

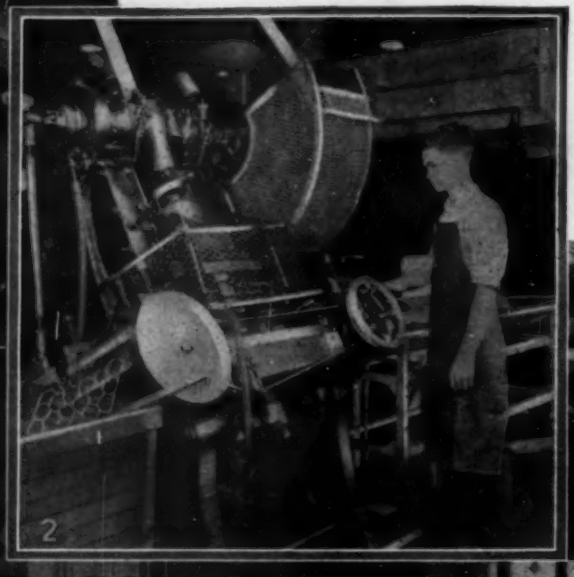


Fig. 2—An automatic roll-feed press, blanking and drawing aluminum capsules. This machine operates at a speed of 100 r.p.m. By using a sextuple die, 600 capsules are produced per minute

Fig. 3—An automatic assembly unit for RO Seals, consisting of two automatic machines with conveyors leading from them and meeting at a central point. One machine wire edges and knurls the aluminum capsule, the other curls the tin discs. A production of 110 caps per minute is maintained on this assembly unit

Fig. 5—An automatic thread rolling machine used for crimping certain types of seals

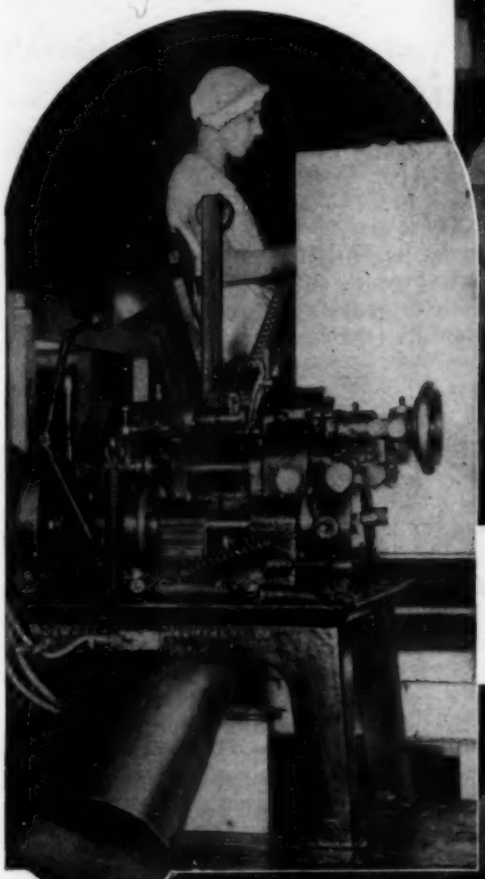


Fig. 4—An automatic assembly unit for Goldy Seals. Girls place tin discs into the pure aluminum capsules as they pass by on a conveyor. A cork liner is then automatically dropped into the partially assembled seal, and the whole is fed into a rolling machine

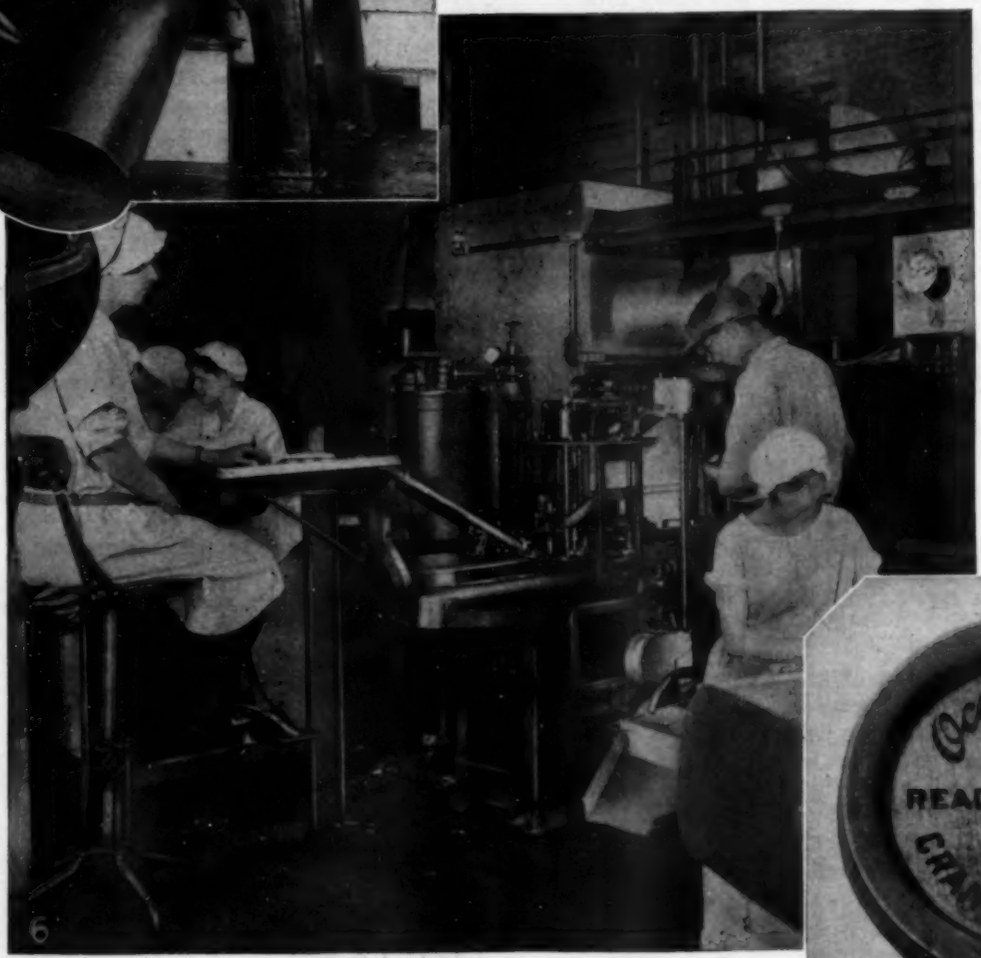


Fig. 6—A Dewey and Almy machine unit for lining seals with a composition sealing compound. The pure aluminum capsules and tin discs are hand assembled, and are then fed into an automatic machine in which liquid rubber compound is flowed around the inner edges of the seal. The seals are then carried by conveyors through two heating units in which the sealing medium is vulcanized

At the right—The type of Goldy Seal shown in the illustrations

Photographs by courtesy of Aluminum Company of America

EXECUTIVE · FORUM

Sales or Sincerity?

THE high esteem enjoyed by Morton Lyle as production manager of the Planet Engine Company was largely due to his thoroughgoing dependability. His methodical mind, organizing ability, and natural conservatism fitted him for the responsible position he held. His commitments, made only after careful consideration, rarely required checking, as George Boyd, the president, had long since learned. These two were going over the week's production schedule, when they were joined by Fred Chase, Planet's go-getting sales manager.

"By the way, Mr. Lyle," asked Chase after a preliminary greeting, "how is the order for the North Bend Railroad coming? I stopped off there on my way back from St. Louis, and every time I turned around they asked me about it."

"We had some trouble with it," replied Lyle. "One of the first main castings wouldn't clean up. That gave us a bad start, but we appear to be out of the woods now. If all goes well shipment should go forward April 5."

"I am afraid that won't keep North Bend happy. They are planning to have these units all set up and running by that time. Their order called for five weeks delivery; that means it should leave here March 29, and they expect us to meet that date."

"That's true," countered Lyle, "but the shop estimate given you called for six weeks. When you asked for an earlier date I rechecked the figures in detail. After making sure that the delivery given you was the shortest with any degree of safety, I stood pat on the original estimate. If you have cut a week from that figure its up to you."

"You know, Mr. Boyd," said Chase turning to the president, "I have been after the North Bend for two years. This order was too good to miss. It meant keeping our boring department busy, and the price was right. This was a real chance to break into this road's business; it was 'five weeks delivery or lose the order.' In a contingency of this kind, I believe the shop should make an extra effort to help us out."

"It's working out so all these orders are contingencies," interposed Lyle. "We want the business just as badly as the sales department. We do not pad delivery estimates, but figure the level best we can do. There must be an orderly shop schedule which cannot be constantly disrupted. Mr. Chase is perfectly free to shave delivery dates but he must then assume the responsibility of explaining the difference to the customer."

Mr. Boyd thought it about time to take a hand. "Chase, I appreciate the difficulties you've had in securing this business and I know that enthusiasm is a vital part of a salesman's makeup. But don't you think that we can build more soundly on a reputation for reliability? We have facilities for making as good deliveries as our competitors. In the long run, won't we create more good-will by making promises that we can keep, even at the risk of losing an order occasionally?"

"Maybe," replied Chase, without seeming entirely convinced, "but competitors are shaving delivery estimates and did so on this very job. The customer is usually thinking of the quotation at hand rather than past deliveries. My job is to get orders, not to lose them."

What Do You Think About This Executive Problem?

Here is a question involving sales as well as production. This case widens the scope of the topics, opened by the Executive Foreman for discussion, to include problems of distribution.

How far should a sales manager allow his enthusiasm to carry him in his effort to secure orders? Can he safely stretch a point now and then or is strict reliability the best policy? A letter to the *American Machinist* expressing your views will be of interest to other readers. All contributions accepted will be paid for.

DISCUSSION

OF PREVIOUS PROBLEMS

Who Should Do the Estimating?

I believe that in the modern industrial market, with its keen competition and close margins of profits, estimating is a decidedly important function, so important in fact, that its final responsibility must be concentrated, but its detail analysis shared. Final responsibility should rest with an officer of the company, but the best personnel resources of the concern should be organized so as to bring to him, through regular channels, the detailed break-downs on which the final figure is based.

Therefore design costs and design time estimates should originate in the Engineering Department, material costs and delivery dates in the Purchasing Department, and shop costs and manufacturing dates in the Production Department. Capable estimators should check these detail estimates, with particular reference to schedules already existing, which may interfere with the use of personnel or equipment, so as to assure not only correct costs but also correct ultimate delivery dates of the furnished product. Where a job is a repeat, or obviously similar to a previous job, these estimators should have authority to take responsibility for these estimates based on returned costs and recorded data, the report of course indicating that this has been done.

—CHARLES KLYNE, *Foreman, Russell Machine Company.*

Should Estimates Be Given Operatives?

I believe that in general much is to be gained by giving cost estimates to operatives. I base my conclusion on the following reasons:

(*a*) Every man should have a definite concrete objective on every job.

(*b*) If the estimate is thought unreasonable, it is better to raise the issue before, rather than after, the money is expended.

(*c*) An estimate "watches" a man all the time, a foreman only when he is in the shop at the particular man's station.

(*d*) An old hand tends to become "set" and evolve his own ideas of production speeds, an estimate sets a general standard for him at all times.

(*e*) Without estimates, old obsolete equipment is liable to remain longer, for the foreman naturally allows for lower prodution on the operator on these machines. An estimate drives such equipment out of the shop.

(*f*) Most "fast" men are such through inherent good personal traits, an estimate will not slow them up. In the few cases where it might unfavorably affect them, there will be at least three or four slow cases sped up for each fast man slowed down.

(*g*) Estimates make a game out of work, they set up a record to try to beat, and the competitive play instinct is worth capitalizing.

(*h*) Estimates create good-will in the end, despite contrary opinions, because they give the operatives a chance to see the foreman's angle, and develop a realization that the foreman's cry for more production isn't just natural meanness.

(*i*) With an estimate, a foreman's suggestion for improved set-up, feed, etc., is gratefully received and appreciated, while without the estimate, it may be regarded as mere contrariness.

Of course, there are arguments against the practice, but a long personal experience with the matter convinces me that in at least a goodly majority of cases, giving estimates to operatives succeeds better than does the withholding of them. In the end, you are bound to have a more efficient, conscientious and co-operative shop organization.

—JAMES A. STEVENSON, *Chief Planner and Estimator, Naval Aircraft Factory, Philadelphia, Pa.*

Does a Highly Developed System Pay?

Whether the system in vogue be simple or complicated, it should include provision for orders which must get out on time to be given special attention. If it is the business of someone to follow up such jobs right through from beginning to end, looking them up when necessary from hour to hour, and leaving no difficulty until it has been solved, serious delays are few and far between. If a rule or regulation delays progress, the attention of some one who has the power to break rules and to suspend the operation of any regulation should be called to the matter. I have heard men told to do anything short of committing a felony to get a certain job through on time.

—H. JAMES, *Birmingham, England.*

Equipment Replacement in Slack Periods

Our chief worries concern things that never happen. The chief worry, of the gentlemen in the case cited, is whether or not there is going to be a slack period. Judging from the statements of Mr. Wallace that the cash reserves were never higher, and that the order book is well filled, it certainly doesn't sound as though The Ajax Co. was going to the infernal bow-wows. Apparently, what they want to know is, "Is the stock market such a vital component part of business that we may expect business to follow it as a matter of course?" Our answer to that is, "Not by a long shot." Times have changed, and the business man who is not encumbered by the "up-to-date" methods of his youth is in a fair way to make a killing in 1930.

The bold spirits, who took a "flier" in the

market, have all come down to earth, their daring only being exceeded by their lack of knowledge of what it was all about. Naturally, some of these people are "bearish," and probably spend their time wondering why the early settlers ever traded a quart of good whisky for any part of the country. Analysis of the underlying conditions discloses that none of the factors preceding previous stock market declines existed during the recent slump. Neither were the factors, that brought on the deluge, operative in any previous market. Talk to the men who were going to clean up, and you can find the reason for the slump.

If you will look back twenty-five years you will remember the steaming up process that usually preceded a boom. As the boom gained in momentum factories would work night and day, prices would soar, and wages would do the same thing. The limit was the amount of goods that jobbers and wholesalers would stock, and production had absolutely no relation to consumption. When the time arrived, and it always did, where the "ultimate consumer" could not buy the goods fast enough, cancellations were the order of the day all along the line, manufacturer, jobber, and retailer. Since that time business has become very scientific, and the temporary "hand-to-mouth" buying that made its appearance after the war has had a beneficial effect. Manufacturers do not base their production schedules on wild guesses any more, but watch the indicators of business generally, in order to gage the amount of their goods that can be absorbed each year.

The U. S. Department of Commerce compiles information on every branch of business both as to production and consumption, and there are hundreds of private agencies gathering and distributing such data, which enables a manufacturer to control his business in relation to other businesses. The result of this is that the bugaboo of overproduction is fast becoming a memory in every line of business. The big idea today is to get the raw materials into manufactured goods as economically as possible, let the consumer have it as quickly as possible, at the lowest prices consistent with fair profit. These principles have proved important in the regulation of business, and have made America the foremost manufacturing country in the world.

I believe that in the case cited Mr. Wood has the right vision. Whether there is a slight lull in business or not, I would take advantage of present low building costs to erect the additional buildings at the savings in material and labor that can be effected now. I would also weed out the organization, scrap all the obsolete equipment, and replace it with the most up-to-date machinery money will buy.

The slogan, "Never sell America short," has more meaning today than when it was coined. Expansion programs, such as Mr. Wood proposes, are all that is necessary to dispel the doubts of the skeptics.

—WILLIAM E. HAMILTON, *Industrial Engineer, Evanston, Ill.*

How Long Should Records Be Preserved?

The mail order houses, which destroy their orders and correspondence on the day that the orders are filled, are extreme cases, and have adopted a policy that certainly would not answer for the average manufacturing concern. However, it is my belief, that most concerns keep orders and correspondence longer than is profitable. The proper length of time, that such records should be kept, can best be determined by the nature of the business.

The most satisfactory filing system, that I have ever had to deal with, was one that demanded that all orders and correspondence be in the filing department within 24 hours of their receipt. There were no private files in the organization. When it was necessary that some individual have an order or letter, he was charged with it, by placing a card, bearing a description of the matter, in the file from which the material had been removed. Everything was filed under the name of the firm who wrote it, never under the material name.

The principal difficulties, that have been met under other filing systems, have been principally due to private files being kept, too much subdivision, and lack of prompt filing. Such methods are expensive, lead to confusion, and lose much time.

—JOHN MARK MAY, *Watervliet, N. Y.*

Upsetting Production Schedules

Some high officials seem to regard insistance on alteration of schedules as being one way of asserting their authority, and apparently consider that this has to be done in order to justify their existence in the eyes of the production departments. One sometimes is inclined to suspect that the getting of these orders in double quick time, regardless of inconvenience caused, is of the same nature as a fire drill. Both may be justified occasionally, but are always costly. Some higher executives make a habit of riding roughshod over production schedules, until the rule seems to be, that the last job in has to be the first one out. When the production foreman continually see an urgent job stopped for a more urgent one, and that for a most urgent one, they lose interest in schedules altogether.

I remember one shop where the production foremen got thoroughly riled, and the production manager said his hair was going grey, and he would certainly be old at forty unless something was done. Eventually, the president agreed to provide weekly a list of urgent jobs in order of priority, and to let the list have undisputed sway, to remain unaltered the whole week except under exceptional circumstances. The only real remedy is for those responsible to realize the very considerable loss of efficiency caused by upsetting schedules, or have this special work done in a separate department.

—H. J. BURNHAM, *Birmingham, England.*

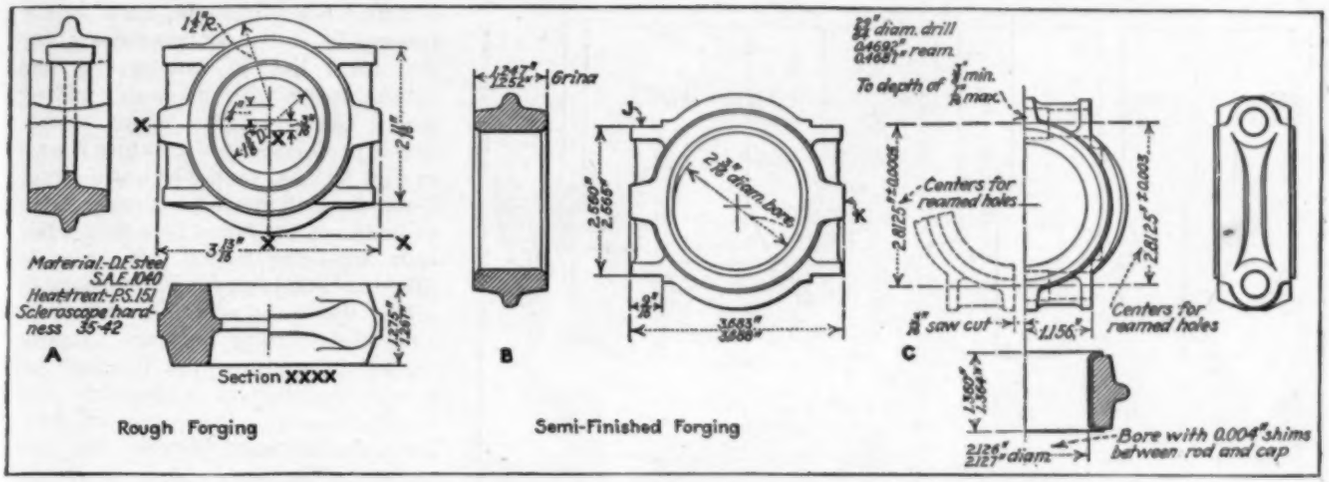


Fig. 1—Three stages of completion of the Nash "8" connecting rod bearing cap. The rough forging is shown at *A*. At *B* the forging is semi-finished, while at *C* it has been babbitted and slit to form a complete cap. The material is SAE 1040 steel

Nash "8" Connecting Rods in Production

By FRANK J. OLIVER, JR.
Western Editor, American Machinist

The steel caps are forged from SAE 1040 steel, rough machined in pairs, babbitted, slit, and finished before assembly with the drop-forged aluminum alloy rods

TO REDUCE the weight of reciprocating parts and thus to allow a higher engine speed, aluminum alloy connecting rods with steel caps have been adopted for the new Nash "8" manufactured at the Kenosha plant of the Nash Motors Company, in place of the all-steel rods used on the 6-cylinder model 460. Fig. 1 shows the steel cap in various stages of completion. The material is SAE 1040 steel drop forged to the shape shown at *A* and heat-treated to a Scleroscope hardness between 35 and 42. Two halves are forged and machined together, including the babbitting operation, after which they are sawed apart, drilled, and reamed. They are then bolted to the rod and finished.

The first operation on the cap forging is to face successively both sides on a Blanchard surface grinder, using the standard magnetic chuck for holding. With these finished surfaces as reference, it is now possible to load the forgings in special fixtures, shown in Fig. 2, on the indexing table of a multiple-spindle Newton miller. Six fixtures are provided, three alternately being work stations, while three are loading. Such a machine has four adjustable cutter spindles each with two gang cutters, and the work table is raised into the cutters. The two outside cutters each cut only one forging, while the two inside ones are simultaneously cutting two forgings, one on either side of center. For this reason the middle of the three fixtures in one set is bolted and doweled to the indexing table, whereas the two outside fixtures are adjustably mounted by means of slotted bolt holes.

Clamping of the piece in the fixture is by plate *A*, Fig. 2, which carries four prongs that engage the forging on the cylindrical sides of the bolt bosses. This plate in turn is centralized by a notched opening that engages a location block mounted on the fixture casting. A C-washer facilitates clamping. With this set-up, boss faces *J*, Fig. 1 *B*, are milled to the dimension 2.560-2.565 in. This simple form of fixture design was finally adopted after some pivoted-link side clamps with cam control had failed to align the forging accurately enough. Initial clamping takes place between V-blocks, one of which, as shown at *B*, in Fig. 2, is slidable and controlled by a hand lever.

In the following operations, in which the locating bosses *K*, Fig. 1 *B*, are milled in a Cincinnati duplex

The first part of the article. The second will appear in an early issue. The reader will be interested in comparing these methods with those of Pierce-Arrow, described on page 890, Vol. 71, of *American Machinist*.

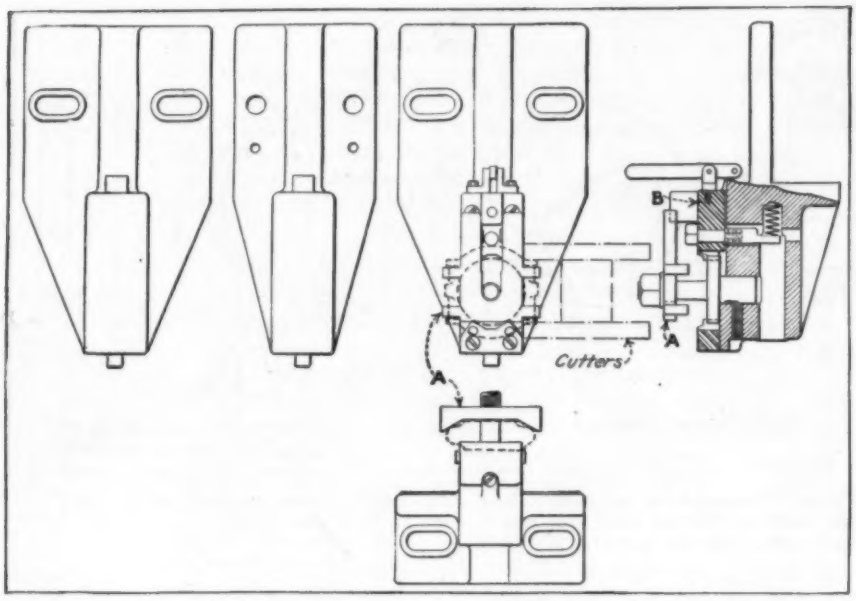


Fig. 2—Three of six fixtures mounted on the indexing table of a Newton 4-spindle miller. Gang cutters mill flats on the bolt hole bosses. Proper alignment of the piece is assured by four prongs at plate *A* bearing against the cylindrical sides of the bosses

miller, the fixture shown in Fig. 3 is used to hold the piece. Four forgings are milled at a time. The pieces are slipped over the mandrel *A*, and the previously milled bolt bosses serve as locating points against two parallel bars mounted on the base of the fixture. A large C-washer facilitates clamping axially, and a latch plate and swing clamp holds the forging against the locating bars. Inserted-tooth cutters about 4 in. in diameter are used in the miller.

Rough boring follows in the Hole Hog drill shown in Fig. 4. Four standard jig plates are set on the indexing table, and four pieces are drilled while four are being loaded. Each forging is positioned by lugs engaging the previously milled bolt bosses, and clamping pressure is taken against pivoted equalizing sub-bases.

A study of drawing *B*, Fig. 1, will indicate that two eccentric bores must be made in the forging in order to compensate for the metal lost in sawing the two halves apart with a $\frac{3}{16}$-in. milling saw. This eccentric boring operation is performed in the fixture shown in Fig. 5 placed on the bed of a Natco 4-spindle drill having hydraulic feed. Four pieces are bored at a time while four are being loaded. In order to produce both bores, it is necessary to invert the piece after the first pass since the locating lugs are so positioned as to throw the forgings off center the correct amount in one direction only. Dimension *A* indicates the distance between the two centers. On account of the heavy side thrust on the tool the boring bar is piloted both top and bottom. Lard oil is used as a coolant to minimize wear on the lower bushing, and the fixture casting is cored so as to provide an ample channel for the escape of the chips and coolant from around the collar of this bushing. Each

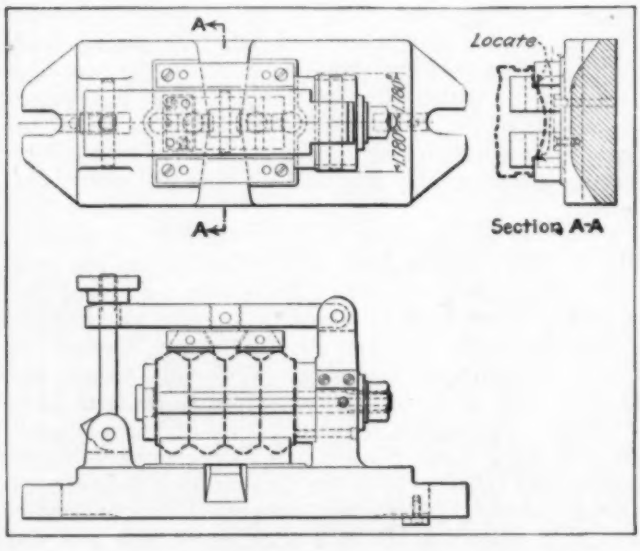


Fig. 3—Another type of fixture used to hold four forgings in tandem while a locating boss is milled on each side in a duplex head machine. Centering the piece is by shoulders of the flats milled in the previous operation

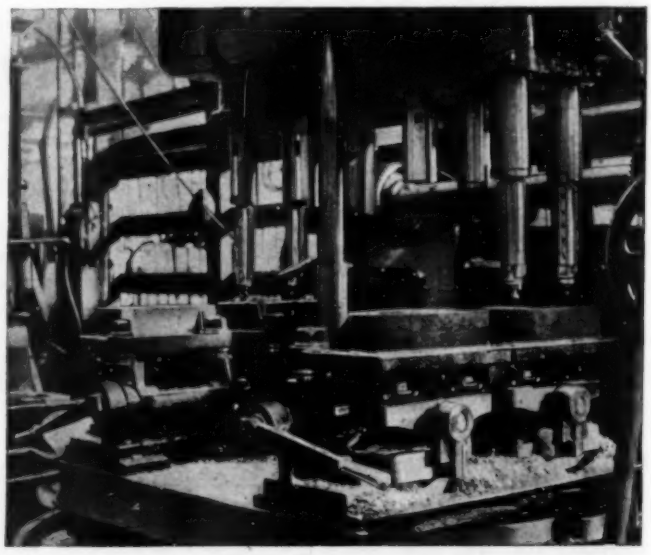


Fig. 4—Rough boring of the bearing hole takes place in this drilling machine. Standard jig plates with special attachments are used. Four pieces are completed per cycle

forging rests on four hardened steel pins and is clamped from above by pivoted yokes with spring release and capscrew clamps. A positive lock of the indexing mechanism is obtained through a taper pin actuated by the small lever at the left in the illustration.

Chamfering of the inside bore is handled somewhat differently in that the forging is mounted in a slide which permits shifting the piece from one center to the other. This operation is performed in a duplex machine of Nash design, in which the two tool heads are advanced hydraulically. Fig. 6 shows the special work-holding fixture with the guide bearings of the tool mandrels built integral with the fixture. Cam *A* controlled by a capstan lever is used to shift the work-holding member, which slides in V-guides. Two hardened steel blocks *B* position the work, which is held in place by capscrew

pressure against block *C*. Lever *E* actuates the locking mechanism for the cam shaft.

The forging is now ready for babbitting, which is done by an outside firm specializing in this work, after which the two halves are sawed apart upon their return to the plant. This sawing operation is performed in the same kind of a set-up as used in the first milling operation. A four-spindle Newton is employed, and the indexing table carries six work-holding fixtures, three in the work position, and three in the loading position.

The two bolt holes in each cap are drilled in a Hole Hog multiple-spindle machine using the set-up shown in Fig. 7. Four spindles are grouped together in three separate positions so that three pairs of caps are drilled at once. One clamp bar with capstan screw holds two halves at a time. The pieces are positioned by the flats previously milled on the bolt hole bosses. During the drilling cycle, which is automatically controlled by a radial cam, six intermediate work-holding stations are being loaded. Upon withdrawal of the drill, the entire fixture can be indexed by hand to the alternate drilling station by means of rack and pinion motion. Reaming of these holes follows in a special machine which will be described in a later article dealing with the production of the connecting rod proper.

The rigidity shown in the design, and the accuracy of the fixtures and jigs are indicative of the care being given to the vital parts of the power plant. They explain, in part, the absence of serious engine trouble.

The psychological value of this is considerable, because the average driver is not much concerned about what happens as long as the engine turns over, but if the power plant is dead, he feels completely at a loss.

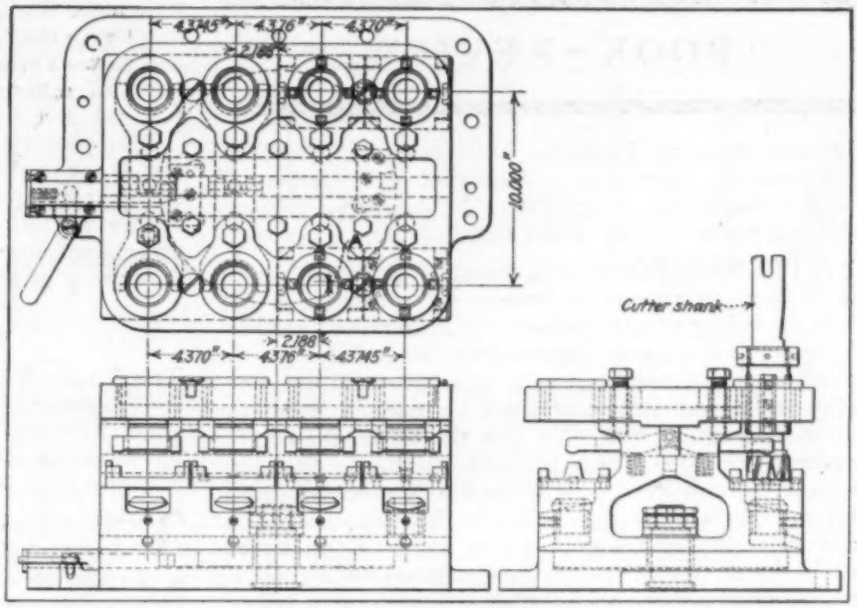


Fig. 5—The locating fingers in this jig are designed to position the forging eccentric to the upper and lower boring bar bushings, so that by reversing the piece after the first bore the second bore will be eccentric to the first

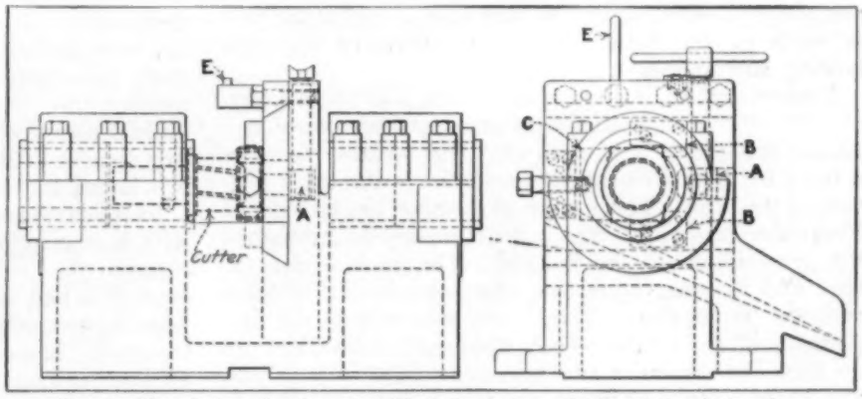


Fig. 6—Chamfering the two eccentric holes is in a single set-up of the piece by clamping it in a slide that can be shifted

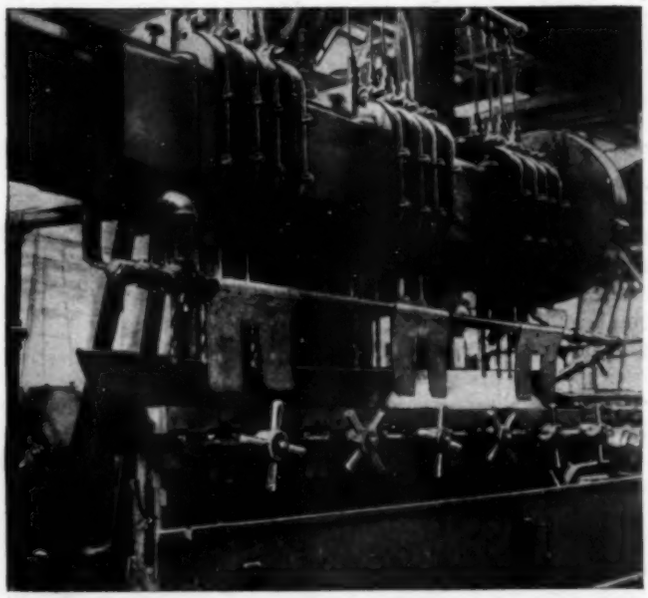


Fig. 7—Before the bolt holes are drilled in the caps, the forging is babbitted and slit apart. Six caps are drilled while a like number are being loaded

THE SOVIET MACHINE GODS—

Whiting Williams, author and consultant, investigator and lecturer on labor and business administration, faculty member of several colleges, former personnel director and vice-president of the Hydraulic Pressed Steel Company, was recently in Russia where he observed the economic situation. His interpretation of what he saw will appear next week in *American Machinist* under the title, "What if the Soviet's Machine Gods Fall Down?"

· BOOK · REVIEWS ·

INTRODUCTION TO BUSINESS MANAGEMENT. *By Herbert G. Stockwell. Published by Harper & Brothers, New York City. Two hundred seventy-six pages, 6x9 in. Cloth board covers. Price $4.*

IN PREPARING this book the author has had frankly in mind an attempt to present information that will help the reader prepare himself for an advanced position. Therefore, instead of approaching his subject in the usual manner from the standpoint of business organization and operations, he presents his material from the personal point of view. To give the reader the correct groundwork upon which to build, there was first presented a general discussion of business and business men, followed by a chapter on scientific thinking in business, and two chapters describing the forms of ownership of business enterprises and the methods of organizing management activities. Succeeding chapters deal respectively with the duties of the president, factory manager, sales manager, treasurer, personnel manager, purchasing agent, advertising manager, office manager, cost accountant, and branch manager. In each case, a critical analysis is made of the duties and qualifications of the men holding such offices.

Business ethics, a discussion of luck and opportunity, certain helpful suggestions on personal appearance and habits, and methods of gathering and utilizing facts as a basis for improvement are presented in the latter portion of the book Throughout, the author has introduced illustrative material to clarify his point and to strengthen the presentation of the thought. The book is easy to read and the suggestions are clear and helpful from a practical standpoint. While not minimizing the importance of any of the officers discussed, the book clears up many uncertainties and prevailing false impressions, and offers encouragement to the individual who is anxious and ambitious to qualify himself for a higher position, but may have been held back by a lack of confidence or a mistaken idea regarding the relative complexity and difficulty of filling an executive office. It is intended to encourage more men in the endeavor to qualify themselves for managerial positions.

*

STEEL TREATING PRACTICE. *By Ralph H. Sherry, consulting metallurgical engineer. Three hundred ninety-five pages, 5¾x9 in. Published by the McGraw-Hill Book Company, Inc., 370 Seventh Ave., New York, N. Y. Price $4.*

OUTLINING the requirements of practice rather than discussing the theories of steel treating, this book gives a general view of its field, including basic principles, but places chief emphasis on a broad non-technical treatment of practice, standard methods, and the industrial aspects of the subject. It is a book written not for the technician, but for the man desiring a general view of the field covered in steel-treating practice. Chapters are included on basic principles and primary processes, composition of commercial steels and working diagrams, physical properties and service stresses, quenching, annealing, hardening, carburizing, inspection and control, fuels, furnaces, pyrometers, and equipment arrangement. An entire chapter is devoted to labor, supervision, and cost. Various points of view are indicated for each point of difference and the entire discussion is clear, forceful, and easily read.

This plentifully illustrated, diagrammed, and indexed text is one of the few good books available which present an accurate cross-sectional view of this new, yet old, science of heat-treatment. It is a text for foremen, superintendents, and works managers, and will, in addition, prove of advantage to the student.

*

THE LABOR MOVEMENT IN THE UNITED STATES. *By Norman J. Ware, professor of economics, Wesleyan University. Four hundred nine 5½x8½-in. pages. Cloth board covers. Published by D. Appleton and Company, New York, N. Y. Price $3.*

THIS volume might also have been designated as a history of the Knights of Labor, since very much of it is taken up with accounts of that organization whose activities constituted a great part of the activities of the period under discussion. Apparently, the author has gone to original sources for a study of the subject, and his analyses of the working of the minds of labor are remarkable. If the same degree of analytic reasoning had been applied to the management side, the book might easily have been a classic. As it stands, he leaves scarcely touched the interesting story of the host of industrial leaders about whom the turmoil raged during the last two decades of the 19th century, when American industry was laying the foundation for its present structure.

In the eighteen chapters of the book the author begins with a description of the condition of labor at the outbreak of the Civil War, and traces its step-by-step development to national organization. His intimate studies of labor leaders and the class mind are the best features of the story. It aims to be fair, and can be read with profit by both management and labor.

*

MACRAE'S BLUE BOOK AND HENDRICKS COMMERCIAL REGISTER. *Twenty-six hundred forty pages, 8½x11 in. Cloth board covers. Published by MacRae's Blue Book Company, 18 East Huron Street, Chicago, Ill. Price $10.*

LISTINGS of many thousands of manufacturers in every division of industry form the content of the book. It is intended primarily as a reference for any firm or individual desiring to know the sources for nearly any product or raw material produced in industry.

The book is divided into three main sections to assist the reader. The first is an alphabetical listing of names and addresses. The second section sorts this alphabetical list under a product list, also alphabetically arranged. The third section lists the names of companies having products known under trade names.

The value of such a book is well known to anyone who answers questions that have to do with sources for industrial products, with locations of companies, and with identification of the makers whose names are secondary to the trade names of their products. Such a book can easily "earn its keep" and pay dividends in every worthwhile buying, selling, and publicity agency in the industrial field.

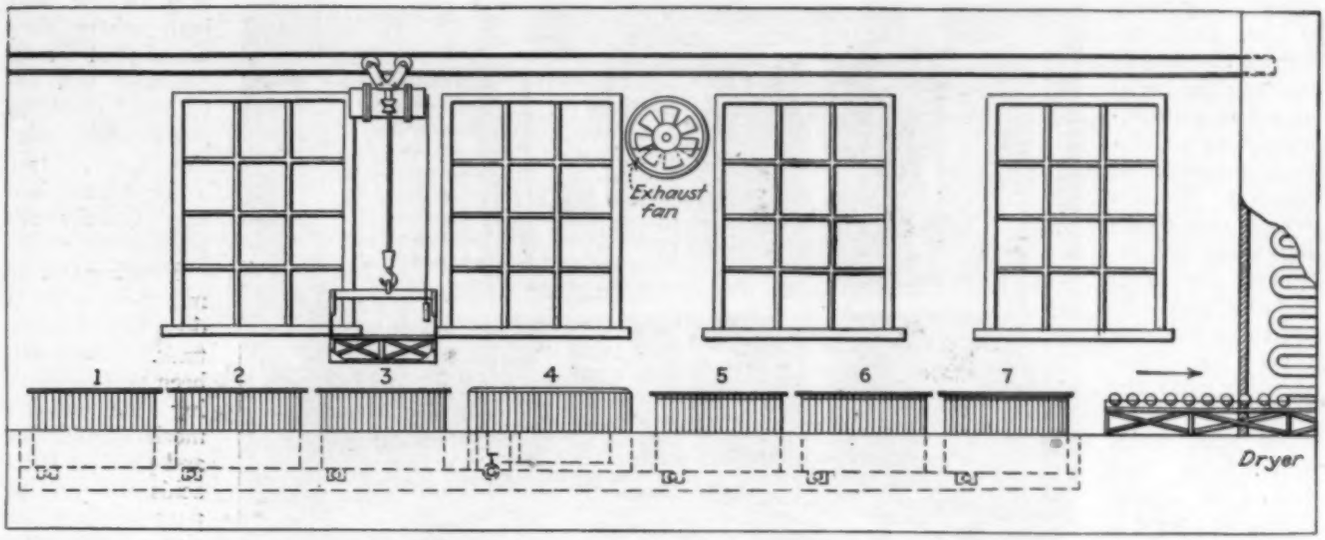


Fig. 1—Layout of a modern pickling room. The first two tanks are cleaning tanks; the third, a water wash; the fourth, a pickling tank; the fifth, a wash; and the last two contain neutralizing solutions

Pickling for Vitreous Enamel

By C. D. CLAWSON

Superintendent, Chicago Vitreous Enamel Products, Company

Many enameling troubles can be traced directly to the pickling room where one of the first and most important steps in the enameling process is performed

BECAUSE the pickling room is the first step and the foundation of the successful operation of vitreous enameling, constant vigilance and complete control of its various functions, must rule. These pickling operations are easily controlled, yet a great many enameling troubles can be traced directly to the pickle room. Since most of these troubles are easily corrected, they may be prevented by proper supervision. The first step is to determine a practical, standard procedure. The second and equally important one is to hold some particular individual responsible for the maintenance of this standard practice.

As a manufacturer of vitreous enameling compounds, our company, through its field service and its own job plant, which is actually a working laboratory, has made a study of pickling practices used by its various customers, and from this work and on the basis of its own experience, it has developed a standard procedure, which will be outlined. Though the particular installation described is its own, it is typical of modern requirements in a pickling room intended for enameling work. In Fig. 1 is a sketch of the layout. Tanks Nos. 1 and 2 are cleaning tanks and are made from $\frac{1}{16}$-in. steel plate welded together at the corners and reinforced with riveted angle irons at the end and top. Steam coils are provided along each side for heating, a drain being placed at the bottom for cleaning purposes. Tank No. 3 is a wooden wash tank made of 3-in. fir. Water enters at one end and overflows at the other through a stand pipe which acts as a skimmer for any scum that forms on the surface.

Tank No. 4 is the acid tank, of 3-in. cypress held together by Monel metal tie rods which are tightened from time to time as the seams open. A Duriron drain is provided at the bottom. Tank No. 5 is a wash tank, and like tank No. 3, is made of 3-in. fir bound by Monel metal tie rods. Tanks Nos. 6 and 7, which are made of steel as in the case of the first two tanks, are used for neutralizing the acid wash. The dip baskets shown in Fig. 2 are made of Monel metal of No. 10 gage, 2-in. width. From the last tank the basket is placed on a conveyor which goes through a drier about 25 ft. long. Steam coils with forced draft aid in the drying of the parts.

In general the operation consists of cleaning the parts of oil and grease, pickling them to remove the scale, washing and neutralizing the remaining acid. On parts that are only folded, the removal of grease and oil is comparatively easy. Articles that are pierced or drawn, however, present a more difficult problem owing to use of a larger amount of drawing compound. Several years ago it was considered good practice to scale or anneal the material, thus burning off the grease. This is still necessary in certain branches of the industry. A more efficient means, however, is to boil the pieces in a solution of water and an oil-removing compound. There are many of these standard cleaners on the market, but there are certain drawing compounds that are removed more rapidly than others, and a thorough study of these should be made to permit the most efficient operation in

the pickling room.

The time required thoroughly to clean the metal of oil is approximately twice the time required for pickling. For this reason two cleaning tanks are required for each pickling tank. In preparing the solutions for these cleaning tanks, the tanks are first filled with water which is then heated to boiling. The cleaner is best added in 15-lb. quantities, allowing each batch to dissolve before further additions. The starting strength of these solutions is 4 oz. per gallon of water, unless a heavy oil is used as a drawing compound when 5 oz. should be used. For the average run of parts the time required is from 10 to 15 minutes.

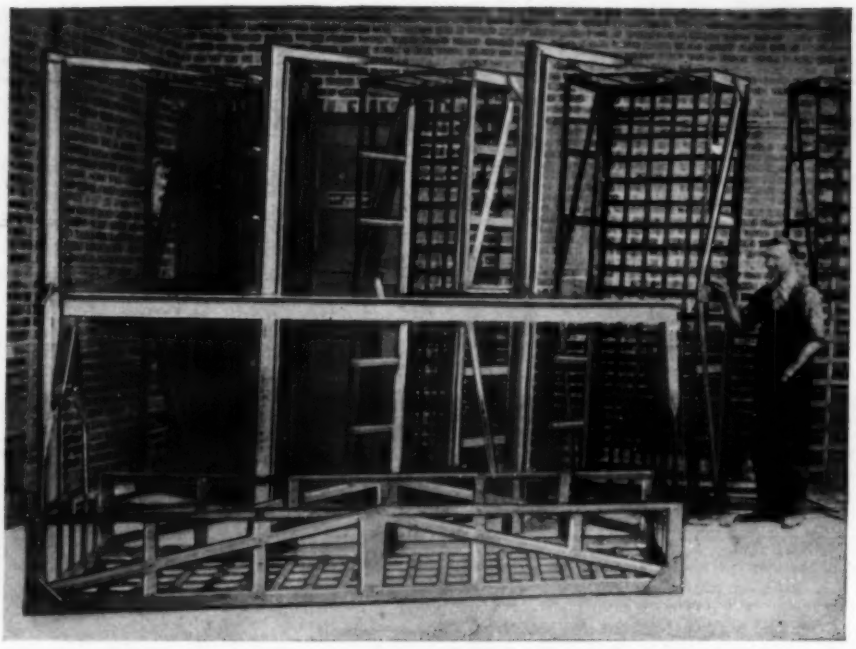


Fig. 2—A group of Monel metal baskets used for pickling large pieces of sheet metal preparatory to vitreous enameling. The basket measures 40 x 102 in. by 16 in. high and is made of 10-gage material on the bottom and 14-gage on the sides, with gussets and angles of 10-gage material

At the end of each day's run a certain amount of cleaning compound will have been exhausted, and a certain amount of water will have been lost due to evaporation. Hence, compound and water must be added daily. These additions vary according to the production, but it has been found advisable to increase the solution by adding 16 lb. of compound daily for every 1,000-gal. tank where 6,000-10,000 sq.ft. of material has been cleaned, depending upon the type of oil removed.

After a considerable period of operation the cleaning solution should be emptied and renewed. The average life of a 1,000-gal. tank is from six to eight weeks, or about 500,000 sq.ft. of surface of material. Although the solution will clean for a much longer period, it is advisable to renew the solution at the end of this period and thus be assured of a positive cleaning operation.

After the metal parts are boiled, with as much agitation as possible, for 10 to 15 min. in the first two cleaner tanks, they are transferred to the third tank, which, as mentioned previously, is a clear water tank with a constant supply of fresh water. The purpose of this bath is to rinse the excess cleaning solution from the material. Unless this is thoroughly done, the acid solution that follows will be noticeably weakened. The parts should be raised and lowered several times in this bath before they are removed. Upon removal, if the water film breaks apart in spots as it drains from the piece, the cleaning operation is not complete, and the load must be returned to the cleaning solution.

Occasionally the raw stock is permitted to remain in the stockroom until badly rusted. After the forming operation, a condition of this kind makes the removal of grease a difficult problem. It is best accomplished by annealing, but may be done by boiling the parts the customary time in the cleaning solution, washing, transferring to the acid bath where they are pickled for 10 minutes, and returning them to the cleaning solution until free from grease and oil. Usually this suffices.

Pickling and removal of scale is done in the fourth tank. Much has been said concerning the relative merits of muriatic and sulphuric acids for pickling purposes, but either can be used with satisfactory results. When a sulphuric acid bath is used, its strength should be 7 per cent, temperature 150 deg. F., and the time of immersion 10 minutes. When the steel pieces are immersed in the acid solution the iron is attacked, forming iron sulphate and liberating hydrogen gas. The scale itself is not attacked to any perceptible amount but is removed from the piece partly by the dissolving of the iron to which it adheres and partly by the agitation, resulting from the liberation of the small hydrogen gas bubbles. The chief object sought is to remove the scale without dissolving or etching the iron too deeply. Over-etching may result from an increase in the time, the temperature, or the strength of the solution, but there is a certain latitude permitted in these components, often necessary when the ware is badly rusted.

Over-pickling may be detected by the appearance of the piece. Often the part is covered by a black scum that may be removed by sponging with water. Another surface effect that indicates too much pickling is a salt and pepper finish, wherein the surface appears etched with a black and silver granular finish. It is generally conceded that the metal absorbs some of the gas liberated in its pores in over-pickling, and unless boiled for a considerable period in the neutralizing bath, copper heads and similar troubles will develop in the burning of the ground coat of enamel. This trouble can be eliminated by leaving the pieces in the neutralizing tank for a longer time than usual.

Under-pickling can be detected by the appearance of the pieces, as a properly pickled piece should have a perfectly clean surface. If any dirt, rust or scale is adhering to the metal, the parts should be re-pickled.

Each load of pieces that are pickled consumes a certain percentage of the acid in solution. For this reason the pickle bath should be tested at least twice daily, either by titration or by the use of pickle pills. A pickle solution of 1,400 gal. is usually sufficient for 150,000 sq.ft. of surface. After this quantity of material has been pickled, the action of the solution will become sluggish, although the acid strength remains unchanged. This effect is

caused by the presence of an excess of iron sulphate. At this time it is most economical to empty the tank and refill it with a fresh solution. While the pickle bath can be used longer, the danger of spoiled work is greater.

From the acid bath the parts are transferred to a rinse tank where the excess acid on the surface is removed. This No. 5 tank is simply a clear water wash similar to No. 3 tank. It is well to raise and lower the basket several times in the tank, since any acid carried into the following tanks will react with the neutralizing agent, thus making it less effective.

Two neutralizing solutions are recommended, although many plants use only one. When two tanks are used, the first neutralizing solution is the strongest. In the remaining tank a much weaker solution is used, and in this manner the minimum deposit of alkali will remain on the part when dried, although a thorough neutralization is assured by the use of the stronger alkali in the first neutralizing tank. The smaller the alkaline deposit on the pieces, the better the ground coat of enamel will drain. This deposit acts as an electrolyte on the ground coat and will often set-up the enamel, making it difficult to work.

Several proprietary cleaners are available on the market under various trade names. Fundamentally, they consist of varying proportions of soda ash, borax, and tri-sodium phosphate. When one tank is used, it is recommended that $\frac{1}{4}$ oz. of the compound be used per gallon of water to start, and $\frac{1}{4}$ oz. per gallon added when one-half the production is run. When two tanks are used, $\frac{1}{2}$ oz. of compound per gallon should be used in the first tank and $\frac{1}{8}$ oz. in the second tank.

These solutions should be boiling at all times. The time required is from 3 to 5 minutes in each tank, although it may be longer, if more convenient, without affecting the ware.

These solutions will slowly become filled with a precipitate of salts of calcium and magnesium from the water and a brown sludge from the deposition of iron hydroxide. It is not advisable to continue to strengthen the solutions as they weaken, but rather to empty them and refill the tanks with fresh solution. The average life of a tank of 1,000 gal. is the time taken to neutralize 15,000 sq.ft. of steel where two tanks are used, and 6,000 to 8,000 sq.ft. where only one tank is used.

After coming from the last tank, the metal parts should be placed as quickly as possible in a drier with a good circulation of air at 250 deg. F. A properly cleaned piece of steel varies in color from a bright silver to a straw color.

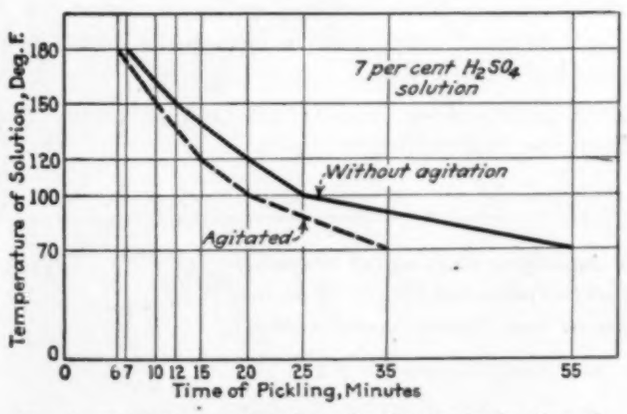


Fig. 3—Chart showing the effect of agitation on the time of pickling at various temperatures

It is recommended that the solutions be kept as hot as possible in all cases, but if low temperatures are employed it is advisable to provide some mechanical means of agitating the solution. Fig. 2 is a graph showing the effect of agitation upon the time of pickling; this curve indicates that at 70 deg. F. agitation reduces the time of pickling by about one-third. At higher temperatures, however, agitation has little effect upon the time of pickling. Agitation may be accomplished by raising and lowering the basket containing the parts several times, or by the introduction of compressed air at the bottom of the tank. If, however, the cleaning and neutralizing solutions are kept boiling, and the acid bath is kept at 150 deg. F., very little mechanical agitation is required, since the natural agitation in the liquids at these temperatures is sufficient.

Steam is generally employed as the source of heat for pickle room solutions. There are two methods for the use of steam, the open steam jet and the closed coil. The open steam jet is best adapted where the steam pressure is above 50 lb. per sq.in. When lower pressure is used, the dilution of the solution may become serious. If boiler compounds are used, or the boiler feed water is treated with chemicals that may prove harmful to the solution, the open steam jet should not be employed.

When a closed coil is used, the chemical content of the steam cannot affect the solution nor can dilution occur. The condensed steam is either returned to the boiler or permitted to escape outside of the tank. This method is generally found to be the more satisfactory, as it permits exact control in all solutions.

One point often overlooked is the loading of the pickle basket. It is absolutely essential that sufficient space be allowed between the pieces to permit free circulation of the solution. Without this circulation, the action is much slower, and often incomplete, leaving the articles in a spotted condition.

To sum up, the following points should be watched in making a daily check-up of pickling operations: (1) Cleaning tank must be kept at proper strength and temperature; (2) scum should be removed from the cleaning tank as fast as it appears on the surface; (3) rinse tanks should be supplied with a constant source of fresh water and an overflow; (4) acid tanks should be kept at the required strength and temperature, and a careful check should be kept on the total amount run through daily so that the tank can be renewed at the proper time; (5) a check should be made of the time required to clean the pieces properly, and the operator should constantly inspect each load as it is pickled. Care should be exercised in seeing that the neutralizing solutions are removed at the proper period and are kept at standard strength. An excess of neutralizing deposit on the piece will cause the enamel to set-up, and proper draining cannot be obtained. This condition may not be apparent in testing a few pieces, but may take place gradually, causing constant additions of water to be added to the ground coat of enamel. As a result a false body is given the ground coat.

OIL-WELL drill bits have undergone many changes in design as a result of the introduction of alloys and improved methods of heat-treatment. Rotary drill bits have been designed and perfected made of alloy steels. Important among the types of rotary drill are the "fish-tail," "rotary-disk," and "Reed-roller" bits.

The following narrative is a "case" presentation of the topic. It has been written to involve some of the questions that arise in the average shop. For guidance in preparing discussion the questions given at the foot of the page have been prepared

Why Conferences, Anyway?

"SOME conference!" grouched Ed, as he and Al came out from the weekly foremen's meeting. "To think of all the work I have to do, and then to stick around more than an hour listening to that bunk!"

"Only that wasn't a conference, Ed," spoke up his friend Al. "That was an accident—an accident trying to get somewhere to happen!"

"What do you mean—accident, Al? Then you don't feel it's any use going to these meetings, either?"

"According to Webster, Ed, an accident is 'a non-planned event that occurs without foresight.' That's what I think many shop conferences are—accidents! They're great places to have a smoke, but that's about all! What we need at those meetings is leadership—someone to unravel the wild discussion and set the gang going along one track."

"But we have a chairman and a secretary, Al. You wouldn't want to get one of the main office birds in, would you? I thought you believed in democracy and home rule."

"Sure, we have a chairman, Ed. And Phil Waites is a good meeting chairman down at the lodge. But it's different here. Bill is a foreman of a particular job—same as all of us are. He has his own bone to pick, and I don't believe any foreman with the same authority we have can act on questions affecting himself as well as the rest of us. The gang won't believe he can, anyway, so they

"you sillies, I tell you the hole should be inserted into the tube!"
"nonsense. the brass should be slipped down over the hole!"
"I still insist that the brass should be wrapped around the hole!"
"and I repeat that the hole should be pulled out afterwards!"

continue to argue until doomsday."

"But, Al, when we started to have these foremen's conferences, everybody said the foremen should run them without interference from the management, and Williams agreed."

"That's right, he agreed, Ed, because the foremen were so set on having it that way. You remember they said that without a management representative the fellows would be free to speak more plainly and get at the root of things. Looks now as if they were uncovering so many roots the tree won't grow."

"Well, I'd hate to have to admit to Williams that we can't run our own jobs, Al. Besides, an executive sitting in would dominate everything."

"Nothing of the kind, Ed. We run our own jobs, but when we all get together it becomes a plant job, and not any one foreman's. I feel that every foremen's conference should be presided over by someone from the management. If he is a good executive, I don't believe he'll dominate. He'll be more interested in letting the foremen talk, and seeing whether they have any good ideas. Then he can pass judgment and keep the ball rolling."

Are not committees and conferences usually a shifting of responsibility, or a pandering to the so-called self-expression idea? Which is the least desirable, unlimited discussion, or insufficient consideration?

Cartoon by courtesy of the Chase Brass Company

All foremen are urged to discuss these questions vital to their work; of course the

DISCUSSION OF EARLIER TOPICS

More Ways Than One

IN GENERAL, there are only three ways of cutting threads, milling, cutting with a lathe tool, and tapping. Often some adaptation of one or more of these methods must be used. In practically every case, it is up to the foreman to work out the solution, as he is the man looked to for results. He is placed in his position to get results, and sometimes more is expected from him than the equipment supplied him warrants. Often he exceeds expectations and overcomes many of the limitations imposed by the lack of equipment. Naturally the foreman is concerned in the results as he is close to the actual operation and is interested in putting the thing over.

The engineer and designer are less concerned with the details of doing the work, as their interest is not as specific as that of the foreman. Usually they have the benefit of greater knowledge and wider experience; they have more leeway in their work. Often, little thought is given as to how the work can be handled in the shop, at the time the design is made, the foreman being expected to take care of any difficulty which may come up.

—L. O. BROWN, *Toolroom Foreman, Holcomb and Hoke Manufacturing Company.*

*

Should the Workman Share Responsibility?

ED MADE a mistake in firing his best man, which he did while out of temper, although his pride would not allow him to admit the mistake even to himself. In view of the fact that Ed considered the man his "best man" it is assumed that the man had proved himself over a period of time as a good workman and one that could be trusted. Therefore, the man was undoubtedly sorry and humiliated when his mistake was shown up, and his retort that "he would do the same thing again, under the same circumstances," should have been discounted as due to temper and resentfulness at being loaded with the full responsibility for the mistake.

It is the duty of the foreman not only to give instructions, but to make sure that the instructions are thoroughly understood by the person to whom given.

Given the castings and the old jig, the man was responsible for doing the job in a workmanlike manner, but if it was apparent that the jig could be located incorrectly the man should not have gone ahead until he had consulted Ed; to do so would lay him open to criticism and censure.

—GEORGE FIELDING, *Designer, E. I. duPont de Nemours Company.*

Who Shall Be Laid Off First?

I DO NOT think that shortening the working hours so all may work is fair. What has a good mechanic, who has given his best for his employer, got to look forward to if when slack times come he is forced to work short hours, with men who have not been in the employ as long as he has, and who, perhaps, are largely drifters?

It is all well and good to talk of a man's family, but if that man wanted to work steadily, would he not try to become a good, valuable man to his employer so as to partially insure his working steadily? My belief is that ability and seniority should both count about on a ratio of 2 to 1 when a lay-off comes. Certainly a man of ability is valuable, but if the employer expects loyalty from his employees, he must do something to protect his "long time" men, as they have given the best of their lives to his cause.

—CHARLES R. WHITEHOUSE, *Chief Timer, Holtzer-Cabot Electric Company.*

*

Eating During Working Hours

A GOOD foreman should never make a rule with a threat of discharge attached to it, and then make the mistake of doing anything that might give the impression that he himself is an exception to the rule.

Ed did just that, when he came out of his office eating an apple. There might be more men, who like himself, eat only an apple for lunch. Therefore, if he is going to judge these men by what they do not eat at noon, I don't see how he is going to get away with exceptions to the rule.

Knowing that most people eat a light breakfast and get hungry before noon, it is a good plan to permit a ten minute lunch about 10 a.m. on the company's time. This can be made up by a rule that employees must punch their card five minutes before starting time in the morning and in the afternoon, which will allow them time enough to be ready for work when the whistle blows. Failure to punch in before the required time means no pay for the ten minutes lunch period. Allow no lunching at any other time. It is surprising the result obtained from this plan.

The above plan has been in use for the past ten years by our company and I find it a great help.

—C. L. NADON, *Superintendent, Globe Union Mfg. Company*

*

The Ethics of Making a Change

I CAN best answer this with another question: What makes a man want to change jobs? Usually, discontent with his present job, or ambition to move ahead faster than his present situation seems to afford. Discontent may be due to one or a number of petty causes, which, if made known, might often be easily adjusted. Likewise, a man's ambition may lead him far afield seeking a goal which may well be within his present reach. A classic example of that is the case of Colonel Sutter, of early California fame, who sold his vast land holdings to go prospecting for gold, and later witnessed

discussion is not limited to foremen. Letters accepted and published will be paid for

its discovery on the very land he sold. In any case, when a man becomes discontented or finds his ambition balked, his work will usually suffer from lack of application. Naturally, a man's first duty is to himself, but his employer certainly should be entitled to a chance to rectify the offending situation.

It appears then that the first tenet in the ethics of changing jobs would be to make a clean breast of the situation before any definite move toward a change. Most executives are broad minded and tolerant, will lend a ready ear to any real or fancied grievance, and will make concessions to retain a worthy man. They will also usually appreciate the attitude of a man frankly seeking a readjustment, providing his demands are reasonable. On the other hand, the man who has another job in the bag, and approaches his employer for an adjustment of pay or grievance, cannot do so with an open mind while he moves within the glamor of the new job. His attitude is tainted with blackmail, the more so during a rush period when his absence will cause some disruption of schedule until he can be replaced. In that case, the employer may come to terms, but it will not sit well with him, nor improve the standing of the man involved. Again, a man's true worth may not be appreciated by his employer, and no stigma can possibly attach to any one for seeking their own betterment in fair competition.

—ALFRED M. WASBAUER, *Engineer, Ingersoll Milling Machine Company.*

*

What You Do or What You Get Done?

IT IS difficult to fix the percentage of experience and organizing ability required in any executive. They are so interwoven in our everyday routine that we cannot separate them. Experience knows how to do the job, organization plans its execution. In a small shop the working foreman requires more experience than executive ability. The varied and multitudinous operations demand it. While in large shops, where work in the departments is specialized, say grinding, experience must be specialized and organization predominant. Every firm requires production. That is the object of our endeavors. The executive and workman both know this but their line of action to achieve it runs in different channels. The workman only accomplishes the work put before him, while the executive has to give satisfaction to the customer by adhering to dates. To spend time on work which should otherwise be done by the men, shows a lack of foresight, first, in the selection of the men detailed to it, and secondly, in retarding present orders.

—W. LESTYE, *Manchester, England.*

ED'S trouble is due to lack of knowledge of all that goes to make up a foreman's list of responsibilities. Many foremen, knowing that their individual skill is greater than that of any of their men, make the mistake of doing a man's work for him, and by so doing they tend to destroy the man's own self reliance. Most foremen do this because they are afraid that the work will be spoiled if they do not do it, as they do not have confidence in the man's ability to do work of an unusual nature.

A white collar executive is preferable to an executive of Ed's type. At least, he would not have several men standing around waiting for orders while he did some other man's work for him. The best type of foreman, regardless of the color of his collar, is a man who knows his men and his equipment and what can be expected of them, a man who knows how to and does develop his men's individual ability and skill by letting them do all the work assigned them, showing them how if necessary, but always encouraging them to go ahead on their own initiative.

—F. L. INGLERIGHT, *Superintendent, Bradford Motor Works.*

* * * *

THE · NEXT · TOPIC

"Closing the Doors to Late Comers"

Compulsory Membership in the Mutual Aid

SUMMARY OF THE DISCUSSION

Joe Fisher, one of Al's men, did not believe in joining the mutual aid and paying dues for someone else's benefit. Inasmuch as he was not otherwise provident, when he was taken ill his family lacked some of the necessities.

Ed argued that membership in the mutual aid should be compulsory, and cited another plant where it was. Al's reply was that the management was afraid such a course would be considered an interference with the freedom of action of its employees, and might be resented.

INSURANCE is something that has to be sold, especially to young men. The young man is a gambler with fate. He feels that sickness and the want of money will never touch him. Older men know better, from experience, and are more likely to take advantage of insurance.

It is stated that, in the industrial countries of Europe, the idea of financial and sick benefit has been carried much further than in this country. It ranges from compulsory insurance, under state or municipal jurisdiction, to purely voluntary associations that provide even false teeth, spectacles, and other necessities.

Where employers do not sponsor mutual aid organizations, they should have no voice in their management, nor should they dictate the conditions under which men may or must join. While it is true that those who stand in the greatest need of protection do not join, it is contended that the only corrective should be a semi-annual membership drive.

On the other hand, the claim is made that membership should be compulsory because men do not really object to joining; they just don't bother about it, and the neglect reacts to the disadvantage of their dependents.

Fig. 1—Welding an aluminum container with the atomic-hydrogen arc

The Role of
Atomic Hydrogen in Welding

By S. Martin, Jr.
Industrial Engineering Department, General Electric Company

ATOMIC - HYDROGEN welding derives its name from the breaking up of the hydrogen molecule into atoms under the influence of an electric arc, and the consequent giving off of heat in recombination. The hydrogen serves a threefold purpose. In addition to protecting the twin tungsten electrodes between which the arc is established, it acts as a heat intensifier and as an active reducing agent to prevent the formation of oxides during the welding process. Welding is done where the heat is most intense, at the fringe of the fan-shaped flame formed by the hydrogen stream between the electrodes.

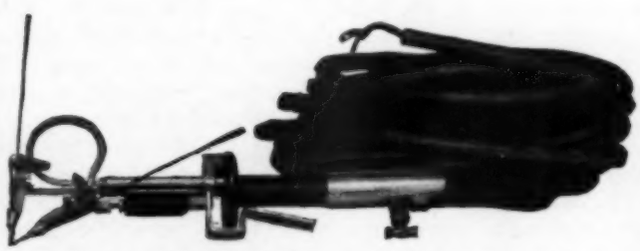


Fig. 2—A lightweight electrode holder, showing electrodes and method of attaching gas pipe and cable

This process differs fundamentally from the metallic-arc process in that the work does not form part of the circuit and the electrodes do not become a part of the weld metal. The circuit is completed between electrodes, the hydrogen shield protecting them so that they are consumed very slowly. Alternating current is used to equalize heat distribution and electrode consumption.

The electrode holder consists of a hollow insulated handle with a heat barrier and two adjustable electrode

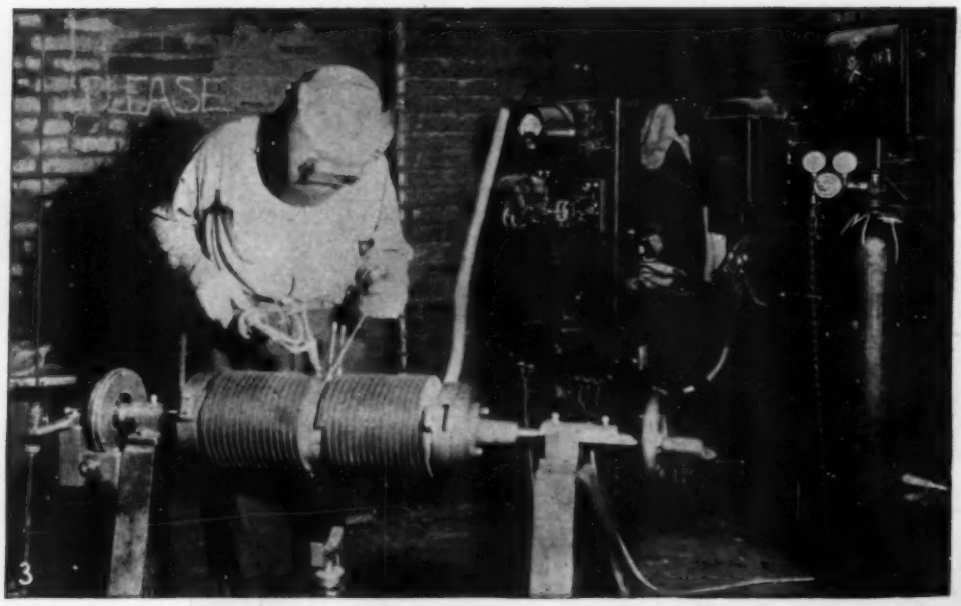


Fig. 3—Welding a 20-gage steel water-cooling reservoir for an oil-burning absorption-type refrigerator. Because of the type of the weld, it is unnecessary to add filler material. No pressure test is made of the finished piece

Fig. 5 — Welding a Connelly high-pressure boiler, 22 ft. long and 3½ ft. in diameter, of ½-in. stock, with ⅝-in. boiler heads

clamps, one of them movable by means of a grip lever. Hydrogen is introduced through a gas tube, controlled by a small valve and manifold in the handle, and brought to the arc through annular openings at the end of each electrode clamp. The conductors through which the gas enters are insulated from each other and from the ground by a protective covering extending outside the loop.

The maximum voltage between the electrodes while welding is that corresponding to the voltage drop across the arc, approximately 60 to 90 volts. When the electrode holder is not in use, the electrodes are touching; the arc is established by separating them. If after the arc has once been established, it goes out, the line contactor will open, disconnecting the electrode holder electrically from the transformer. The tungsten electrodes are made in four sizes, for current ranges of 15-40, 30-60, 35-90, and 6-150 amperes, ranging in diameter from $\frac{1}{16}$ in. through $\frac{3}{32}$ in. and $\frac{1}{8}$ in. to $\frac{3}{16}$ inch.

A maximum temperature of approximately 4,000 deg. C. may be obtained with the atomic-hydrogen flame, an ideal combination of high temperature and a highly reducing atmosphere. Strong, ductile welds, practically free from oxide and blowholes and with a smooth finished appearance, can be made at a rapid rate in steel, cast iron, and a number of alloys.

In general, all varieties of steel, including alloys with nickel, chromium, manganese, and molybdenum, are readily weldable. Steel with a carbon content as high as 1.25 per cent has been welded successfully. It must be kept in mind that atomic-hydrogen welding does not replace the metallic arc in the welding of steel; it simply extends the field into the thin sheet metals and alloy steels. Thin sheet metal here means sheets thinner than 18 gage and includes metals as thin as a wafer razor blade. A good example of this class of work is a refrigerator water-condenser ball fabricated of 12-gage steel drawn into half globes and welded at the equator. Under test, these welds stood a pressure of 2,700 lb. per sq. inch.

The atomic-hydrogen process may also be used on heavy plate applications. For example, the Connelly Boiler Company, Cleveland, Ohio, uses it in welding ship boilers. One of these boilers, 22x3½ ft. in diameter, fabricated of ½-in. stock, with ⅝-in. heads, is shown. It required 23 hours to complete, and withstood pressures of 750 lb. per sq.in., when tested previous to installation.

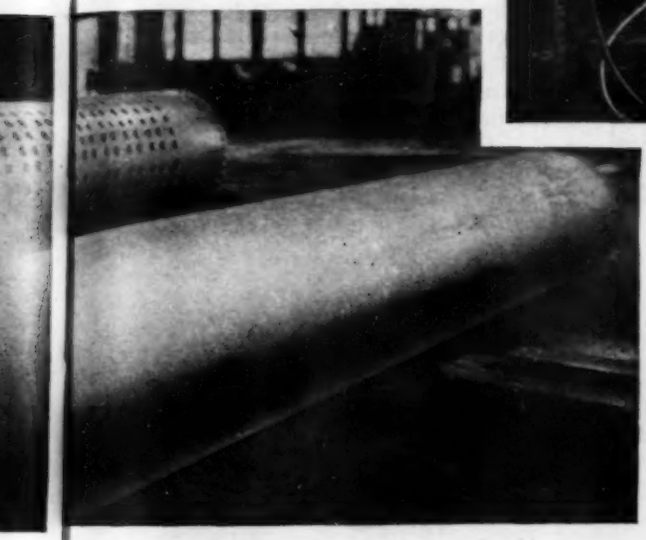
A product designed for welding, the water-cooling reservoir for an oil-burning absorption-type refrigerator, is made of 20-gage steel, which when formed has two upturned edges pressed tightly together and welded at a speed of 28 in. per minute.

Delicate and complicated welding may also be performed with considerable success by the atomic-hydrogen method. An example is the manufacture of an indicating flow meter by the Marian Company, Cleveland, in which all parts are welded, including the joints. It is essential in this meter that no leakage take place at the joints, for the welds must stand a pressure of ½ ton per sq. inch.

Cast steel and steel with a carbon content as high as 1.25 per cent have been welded by this method. High-speed steel tips can be welded to low-carbon shanks, the resulting welds being strong and ductile. In welding thick sections of cast iron where it is necessary to use a filler rod, the difficulties are much the same as in welding by the metallic process. Thin sections of cast iron can be welded readily, as can holes in malleable castings.

Chrome steels, such as Ascoloy (12 to 16 per cent chromium), and chromium steels up to 40 per cent chromium, are readily welded, but yield hard, brittle welds. Heat-treatment will reduce the brittleness when the chromium content is below 20 per cent. If the chromium content is greater, heat-treatment has little effect. Alloys other than steel have also been welded. Nickel-chromium alloys, such as Calorite (15 to 20 per

Fig. 4 — Continuous-production welding of a condenser ball for an oil-burning refrigerator. Two hemispheres of 12-gage drawn steel are welded along the equator in 12 minutes in the jig illustrated. Finished balls are tested at 2,700 pounds



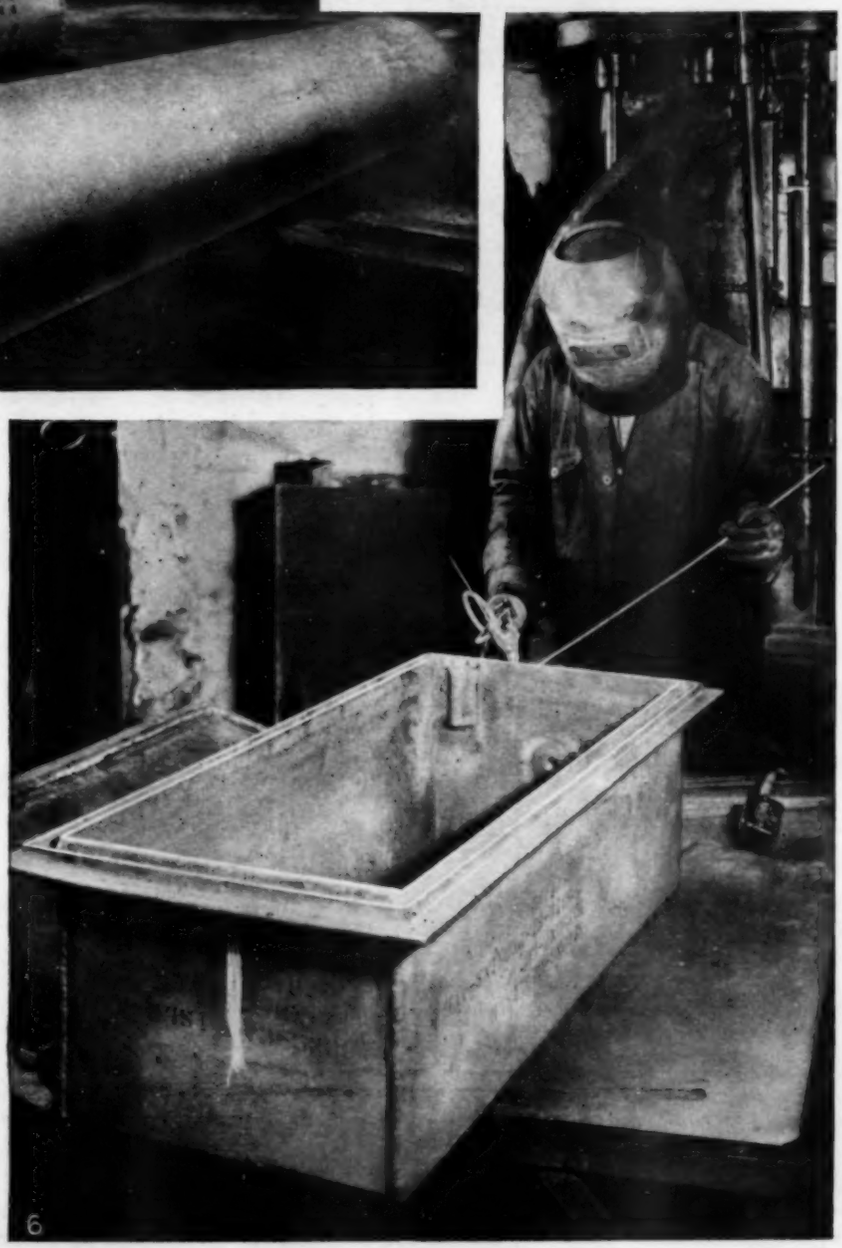


Fig. 6—An Ascoloy case-hardening tank, 36 x 15½ x 12 in., completely fabricated with the atomic-hydrogen arc

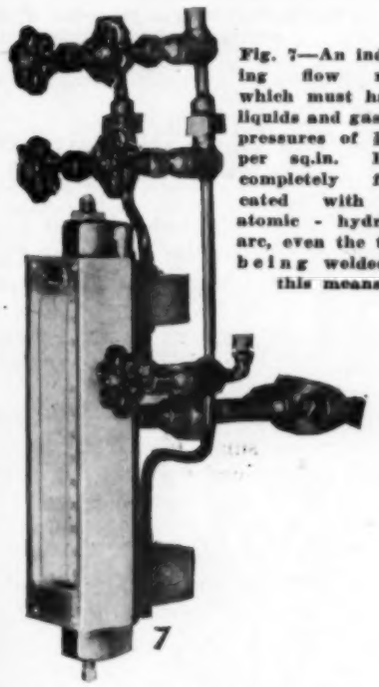


Fig. 7—An indicating flow meter which must handle liquids and gases at pressures of ½ ton per sq.in. It is completely fabricated with the atomic - hydrogen arc, even the tubes being welded by this means

Fig. 8—The finished water-condenser ball, shown previously in Fig. 4. It is completely fabricated by this method

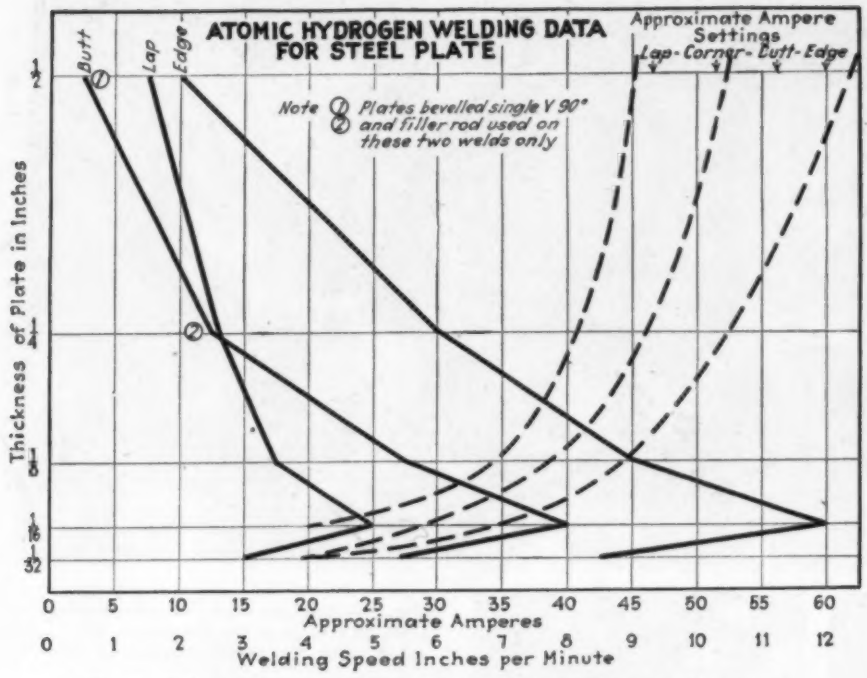

ATOMIC HYDROGEN WELDING DATA FOR STEEL PLATE
Approximate Ampere Settings
Lap-Corner-Butt-Edge
Butt
Lap
Edge
Note ① Plates bevelled single V 90° and filler rod used on these two welds only
Thickness of Plate in Inches
Approximate Amperes
Welding Speed Inches per Minute

Fig. 9—Information regarding plate thickness, welding speed, ampere settings, and similar factors in atomic-hydrogen welding

occurs, a violently explosive mixture of hydrogen and air (9.5 to 74 per cent hydrogen) may be produced. Precautions should also be taken in the handling of the hydrogen tanks in storage. They should not be stored in the open unless they are protected against extremes of the weather. In localities where extreme temperatures prevail, cylinders should be protected against ice or snow accumulations during the winter, and against the direct rays of the summer sun.

Protection for the operator from the arc is likewise essential. Light from the arc contains ultra-violet rays which require the welder to wear a helmet or shield with suitable dark-colored glass as a protection against both direct and reflected rays. Additional protection may be afforded by dark-colored glasses worn under the helmet. Gauntlets to protect the hands from being "sunburned" are desirable, and all parts of the body should be similarly protected.

cent chromium, 85-80 per cent nickel), are readily welded. Though Calorite is used for resistance units in electric furnaces, the welds have been found to hold up under adverse heat conditions. Calorite castings can be welded also.

Aluminum welds readily by this process. A flux is required to remove the oxide on the surface, but the reducing atmosphere of the flame prevents the further formation of oxides during welding. Good welds have been made on sheets as thin as 24 gage. Outside corner welds and fins requiring fillet welds have been handled successfully.

Copper welds present more difficulty, since there is a tendency for small blowholes to form. Good results have been obtained only when the metal was preheated. Copper alloys such as bronze also present difficulties in welding. A good job is practically impossible when more than 40 per cent zinc is encountered. A flux is necessary, sodium chloride (ordinary table salt) being very satisfactory. Duralumin, as in the case of aluminum, requires a flux. Zinc, at least $\frac{1}{8}$-in. thick and commercially pure, has been welded with considerable success.

Special requirements sometimes call for the atomic-hydrogen process to the exclusion of any other. A good example is the bumper and guide for a conveyor cage, made by Emil Steinhorst & Sons, Utica, N. Y. The rollers are set in U-shaped retainers, and the retainer is welded into the bumper frame. The weld is made and quenched before the heat reaches the roller, thus eliminating any annealing action. Several similar applications of this method of welding have been made for similar jobs.

Hydrogen gas is consumed at a rate of 30 to 40 cu.ft. per hour, with a pressure of 1 to 2 lb. per sq.in. Pure hydrogen only can be used. It is a colorless, odorless, and tasteless gas, the lightest substance known, and produces a non-luminous and colorless flame which evolves a great amount of heat. The gas has a tendency to leak out of apparatus because of its extreme lightness. If this

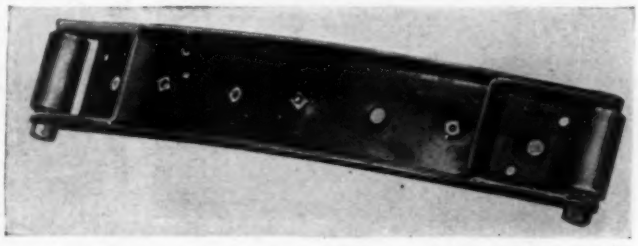


Fig. 10—A bumper guide, welded with the atomic-hydrogen arc to prevent drawing of the roller temper

Ranging from low to high current values, the power factor of the atomic-hydrogen equipment is 28 to 50 per cent. Data for atomic-hydrogen welding may be summarized in the following condensed table:

Thickness of stock (in inches)	Amperes			
	Edge	Butt	Lap	Corner
$\frac{1}{32}$	20-25	15-20	15-20	15-20
$\frac{1}{16}$	30-35	25-30	20-25	25-30
$\frac{1}{8}$	40-45	30-35	30-35	35-40
$\frac{3}{16}$	45-50	40-45	35-40	40-45
$\frac{1}{4}$	50-55	45-50	40-45	45-50
$\frac{3}{8}$	55-60	50-55	45-50	50-55
$\frac{1}{2}$	60-65	55-60	50-55	55-60

Tungsten electrodes are consumed at approximately the following rates:

Electrode (Inches)	Amperes	Kva.	Kilowatts	Electrode Consumption (Inches per hour)
$\frac{1}{16}$	25	7.5	2.3	$1\frac{1}{8}$
$\frac{1}{8}$	35	10.5	3.2	$\frac{3}{8}$
$\frac{1}{8}$	60	18.0	7.25	$1\frac{1}{2}$

High-carbon and low-carbon springs are heat treated similarly, except for a difference in the rate of cooling.

Renewing Wheel Flanges

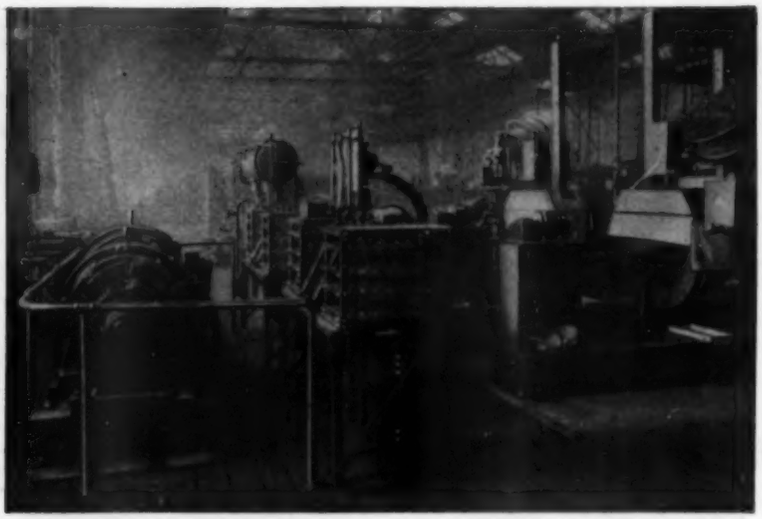


Fig. 1—General arrangement of two automatic welding units. The general cleanliness apparent is characteristic of these shops

THERE is not the same incentive for a street railway company to keep the driving wheels of its cars within maximum and minimum dimension, as is the case with a steam railroad.

There is no supervising agency similar to the I.C.C., and a derailment caused by a defective flange is merely an irritating incident. Therefore, when a street railway company sets up its own standards of flange sizes, and installs expensive equipment in order to maintain those standards, it must be taken as an evidence of good management.

To secure efficient operation of a trolley car, all the driving wheels must be of the same diameter. Otherwise, there must be either a slippage of wheels or a loss of current. This applies, of course, to cars that are driven from two or more trucks, with the motors connected in multiple or series through the same controller.

Acceleration from a dead stop is considered of prime importance in operation, by the United Railways and Electric Company of Baltimore, Md., and many of its cars are built and equipped with that object in view This, together with the fact that the motorman can apply the maximum current to the motors with the knowledge that the wheels will not slip or jump the rail, enables their articulated car to beat an automobile in acceleration from a standstill to maximum speed.

On a railway system where the saving of current is considered important, wheel turning is now given close

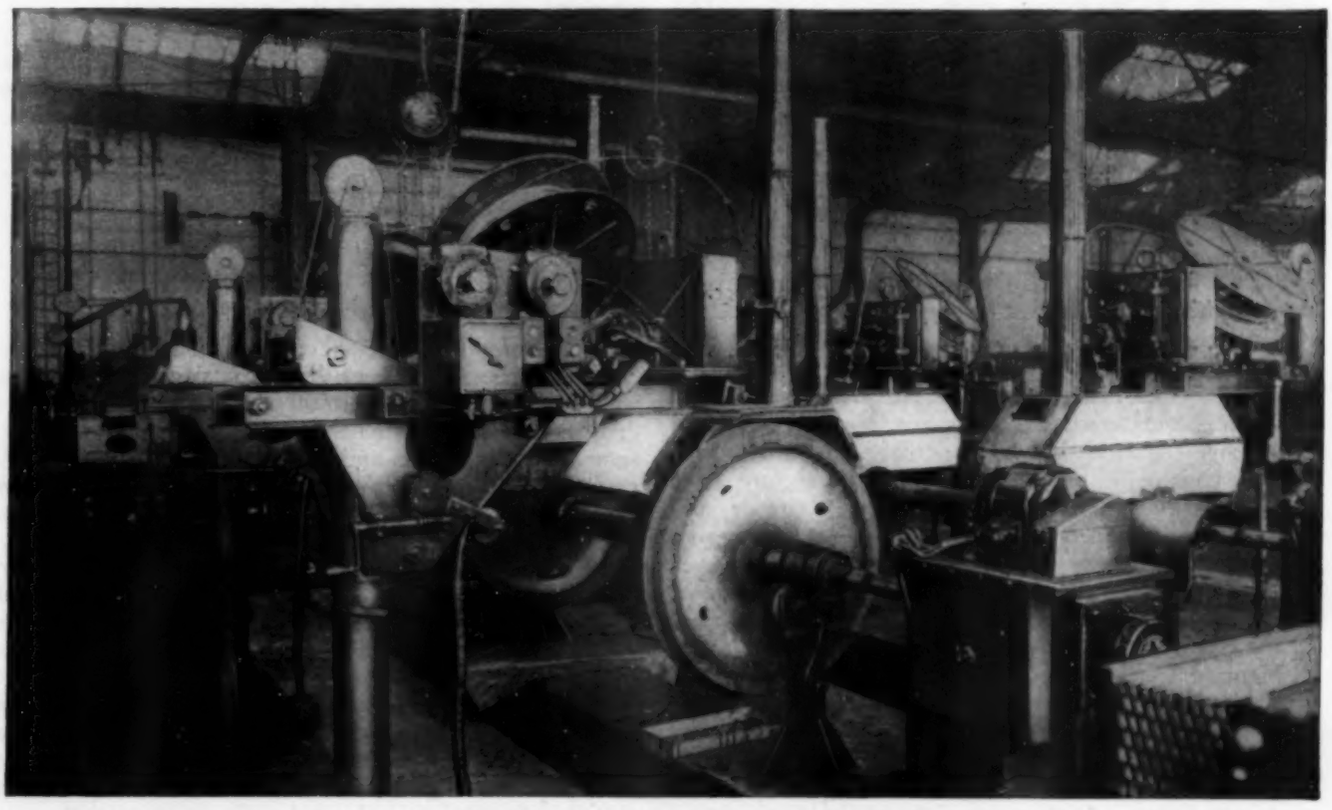


Fig. 2—Close-up view of the two units. During the welding operation the wheels are covered and the journals protected

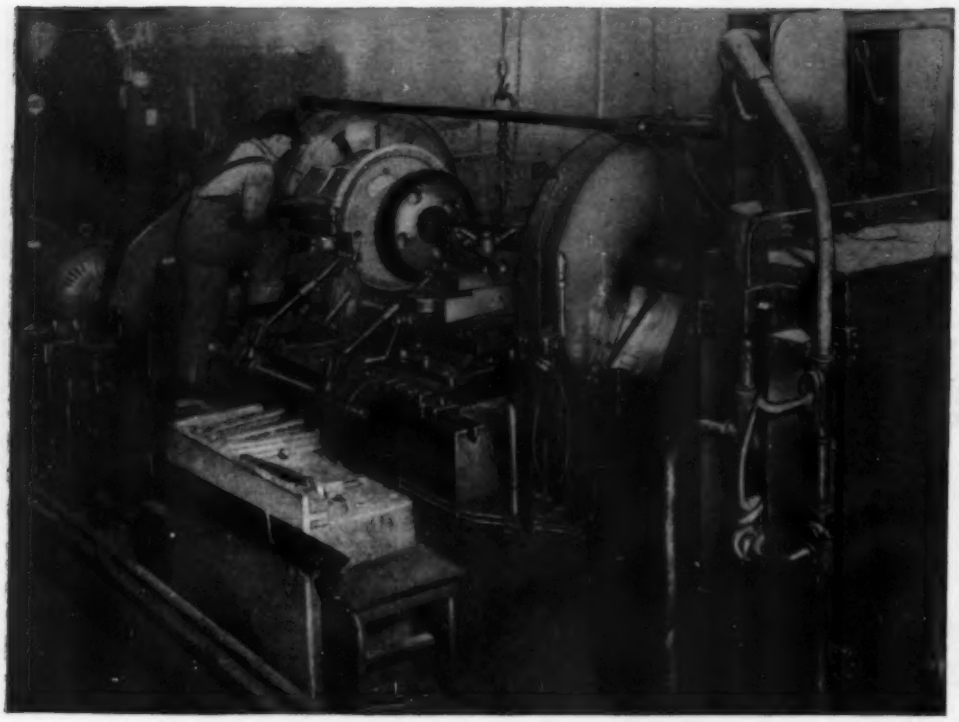


Fig. 3—Turning the wheels in a double-head wheel lathe

attention. Before automatic welding became practical, wheels were turned very infrequently, as it meant turning a complete set to the diameter of the worst one, and the life of the set was materially shortened thereby.

The operating department of that time seemed to think that by delaying the turning of the wheels they could save money, but, unfortunately, it had the opposite result.

A 33-in. driving wheel has a life of about 200,000 miles, provided it is trued up every 50,000 miles. The stage at which a wheel shall be turned is not predicated upon its diameter, but upon its flange thickness. In "truing up," the worst wheel in a set is picked out and the tread is turned down in diameter until the flange is the standard thickness and height. If the flange is allowed to wear too much, it may be necessary to turn a whole inch from the diameter of the tread in order to gain the necessary thickness at the base of flange.

Under such circumstances, the advent of the automatic welder was naturally hailed with enthusiasm, tempered somewhat by the cost per unit.

After the operating department has arrived at the conclusion that automatic welding equipment is indispensable, it becomes necessary to convince the directors that such a substantial outlay is necessary for a seemingly unimportant operation they have, perhaps, never heard of.

The United Railways and Electric Company have 1,400 cars, each of which runs about 20,000 miles per year. To weld the wheels every 50,000 miles, means that 560 cars, or, roughly 4500 wheels must be welded each year. In Fig. 1, is shown the general arrangement of the two-unit, Westinghouse welding equipment installed at the Carrol Park shops for this purpose.

Mention has been made in a previous article of the good housekeeping in evidence in these shops. The screens over the wheels, the provision for taking away the heat, the protection of the journals, and the general cleanliness of the surroundings, bear out the statements that were made. A close up view of the two units is shown in Fig. 2, one unit with the wheel covers in place the other without them. These covers prevent the flash being a source of annoyance and the observation opening with its colored glass obviates the necessity of the welder wearing glasses.

The bearings are protected from scoring by a seamless tube, and the whole is protected from spattering metal by a cover made for the purpose.

If the wheels are removed for welding, at reasonable intervals, the actual welding time is not long. Feeding at 14 in. per min. and depositing an average of 20 beads, one automatic will weld a pair of wheels in 2½ hours, or roughly a car a day.

The cars on this system are shopped at predetermined intervals and the wheels are removed at one of these shoppings, without inspection. Thus while it is found that some require more work than others, none of them are in very bad condition.

After the flanges are built up by welding they are turned in a double head wheel lathe, two operators being used. No data is available as to the difference in the wearing quality of the original and the welded wheels, but it is known that it requires longer to turn a welded wheel because of the tougher metal.

The United Railways uses welding for brake shoes, journal boxes, motor and gear covers, seat standards, in fact, for anything that is weldable. The practice of these shops is in advance of most shops as far as methods go, and their repairs last longer than the original.

Business Ethics—*Discussion*

By P. Ford Smith

President and Manager, The Ford-Smith Machine Company, Ltd.

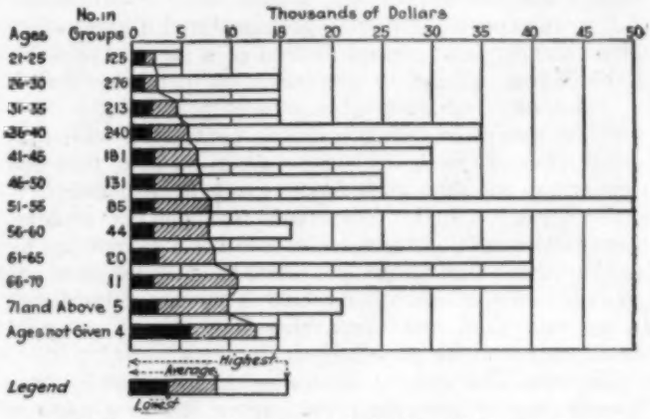
THE reference-book sheet, "Business Ethics," on page 865, Vol. 71, of *American Machinist,* gives a well thought-out set of ethical rules, but there are two or three that are questionable. In discussing the article, some of my associates and I disagreed with item No. 19, regarding the customer's right to detailed specifications for separate items. The customer, on some occasions, has a right to the price for separate items such as patterns, and in some cases, special material. Often the customer may be in a better position to supply material than the company which is doing the work. Also, he often wishes to own the pattern or have the patterns made himself. We further disagree on rule 21, regarding the right of a bidder to know the names of others who are to bid on the work. We do not think the rule is workable at all. Our experience leads us to believe no bidder would get a firm to give him the information which is demanded in this rule.

What Happens to the Engineer

A TABULAR presentation of the replies to a questionnaire issued in 1927 by the Executive Committee of the Machine Shop Practice Division of the A.S.M.E., to 2,700 engineers, its entire membership. Approximately 54 per cent, or 1,460 replies, were received. No identification was attempted. Salary data are presented by six groups of states, divided roughly as follows: Group 1, New England States; Group 2, Middle Atlantic States; Group 3, Central States; Group 4, Southeastern States; Group 5, Pacific Coast States; and Group 6, Mid-Continent States.

Table I—Summary of Salaries

Item	Reporting Number	Highest	Lowest	Average
Ages:				
21-25	125	$5,000	$1,300	$2,122
26-30	276	15,000	1,320	2,966
31-35	213	15,000	1,690	4,390
36-40	240	35,000	1,620	6,176
41-45	181	30,000	1,800	6,585
46-50	131	25,000	2,100	6,750
51-55	85	50,000	2,000	8,070.50
56-60	44	16,000	2,000	7,952
61-65	20	40,000	2,850	8,326
65-70	11	40,000	2,600	11,507
71 and above	5	21,000	2,800	9,080
Ages not reported	4	15,000	6,000	12,500
Chairman, board of directors	2	15,000	5,200	10,050
President	78	50,000	1,200	10,768
Vice-president	70	50,000	2,100	9,318
General manager	37	25,000	2,400	9,296
Asst. general manager	6	15,000	1,820	4,369
Plant, factory, works, mgr.	72	40,000	2,200	7,413
Superintendent	99	16,000	1,800	5,711
Asst. superintendent	30	7,000	2,000	4,076
General foreman	20	5,500	2,500	3,722
Asst. foreman	8	4,200	2,000	2,585
Inspector	7	6,000	2,500	3,580
Chief engineer	165	15,000	1,500	5,391.50
Assistant engineer	70	11,000	2,000	3,928
Chief design engineer	20	5,460	2,100	3,673
Asst. design engineer	156	8,700	1,320 (750 China)	2,690
Chief draftsman	34	5,000	2,080	3,507
Production engineer	66	15,000	1,768	3,953
Time-study methods	46	10,000	1,685	3,624
Efficiency engineer	7	5,000	1,800	2,920
Equipment engineer	5	4,400	2,392	3,598
Apprentice	53	2,700	1,200	1,777
Sales engineer	54	7,500	1,690	3,512
Consulting engineer	25	20,000	2,400	7,465
Sales manager	15	15,000	4,000	7,501
Tooling engineer	19	7,000	2,080	3,069.50
Branch manager	7	8,100	3,600	5,733
Intructors—professors	54	7,000	1,800	3,451
Secretary and treas.	17	15,000	2,400	7,030
Clerical	7	3,600	1,560	2,255
Research	32	10,500	1,300	3,550
Miscellaneous	18	10,000	1,430	4,228



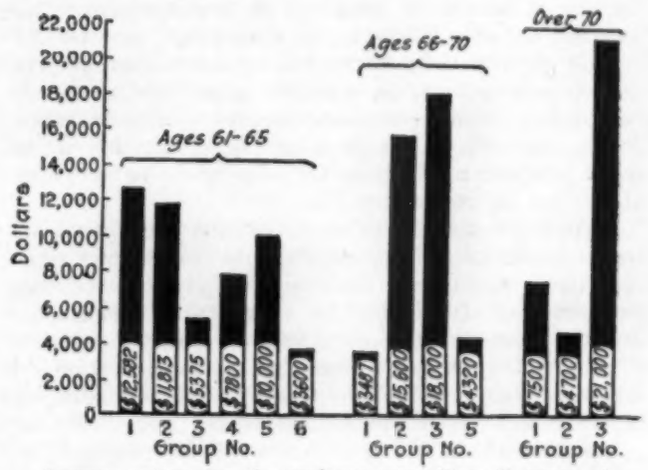
Highest, lowest, and average salaries in various age groups

Table II—Promotions

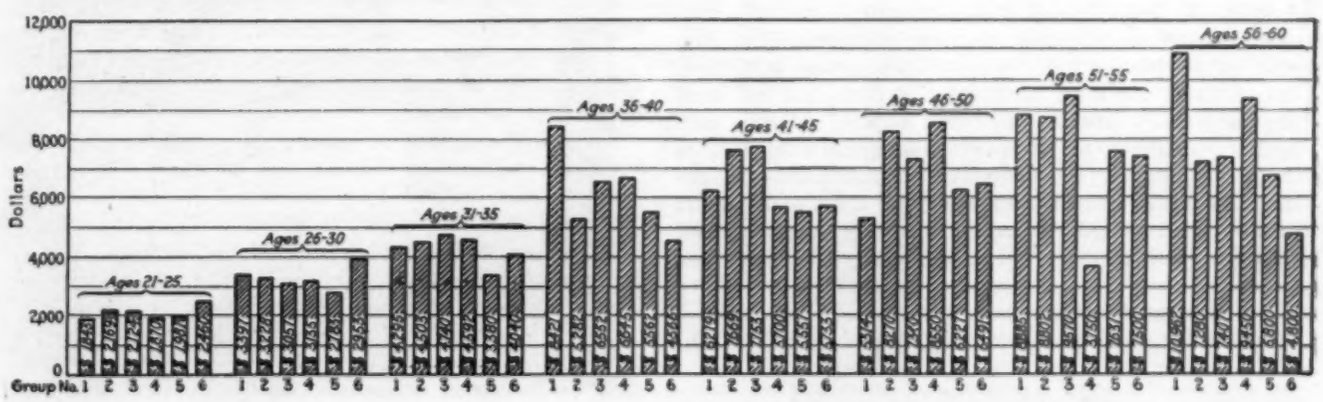
Depending upon:	Answers Received No.	Per cent (approx.)
1—Politics, favoritism, religion, fraternal, etc. (merit secondary)	292	22
2—Relationship (merit secondary)	204	15
3—Partly to merit, other causes with merit	265	21
4—Wholly merit	877	68
5—Seniority—Civil Service	30	2
6—Ambiguous (no reply)	165	12
	1833	120

In the above tabulation the percentage column totals more than 100 per cent (120 per cent) because in some cases two or more distinct bases for promotion were given so that a count was given in the respective columns as from the same reply.

In Item (1), merit was either secondary when considered at all, or else totally lacking. In Item (2) relationship was particularly stressed in many replies so as to justify giving it distinct consideration. Under Item (4) no other consideration than merit was given. Seniority and Civil Service are so closely allied as to warrant their joint consideration (Item 5).



Average salary for the engineer more than 60 years of age, by group



Average salaries in each of the six groups at various ages

Management by Exception

By Chester B. Lord
Associate Editor, American Machinist

WITH scientific management came the problem of its application to industry. The principles laid down by Taylor were epochal, but a positive method of applying them to industry was lacking. As a result, each one who accepted the principles interpreted them and applied them according to his own experience or understanding. It is not surprising, therefore, that there sprang up almost as many schools of management as there were engineers. Neither is it strange that, in some cases, system became paramount and, in the course of time, was considered a major factor of management control instead of a mere expression of individual opinion or preference as to the method to be followed in applying management principles.

When exception management is contrasted with systematic management, it is no longer strange that the former has not been extended to every field of industry, as Taylor advocated. Systematic management assumes theoretical conditions and seeks to control exceptions by making those conditions paramount. Exception management, on the other hand, makes system subordinate to an exception, and must, therefore, visualize actual conditions in order to function.

The very first rule of exception management is that: *"consistency of procedure must never interfere with an obvious exception to that procedure or to its system."* Because it cannot be theorized or systematized, it has been utilized only by the higher executives.

It is obvious that, if the use of the exception principle is confined to the manager alone, and cannot be extended to include his subordinates and their subordinates in turn, it becomes merely a rule for managerial efficiency. Such is not the intent or limitation of the law of exceptions.

In practice, the use of the exception principle separates manufacturing management into two distinct types, and these again into components having a common denominator. It divides the elements of manufacturing and management into constants and variants, and eliminates the constants from further consideration. It separates the variants into planned and accidental exceptions and ignores these also unless, and until, they vary from plan. It furnishes a self-corrective, compulsory method of management that functionalizes the processes of management by automatically apportioning the duties to those best able to perform them.

The exception principle is more dangerous in the hands of careless or mediocre executives than is system. There is such a thing as a weak system but no such thing as weak control, it is either control or it is not. Another drawback to exception management is that it cannot be applied theoretically. Systematic management concentrates upon influencing the mass of elements to follow a given path. It cannot visualize the stragglers. Exception management, after pointing the direction, ignores the mass and cencentrates upon any items which show even a tendency to stray.

Experience shows that probably 70 per cent of manufacturing and management items will follow a planned path if not molested. Control consists in anticipating which 30 per cent will stray, and when.

Reduced to its final terms, the art of management is to plan each element that enters into or affects its application. The problem of management is to forecast which of the elements will vary from its plan, when it will vary, and what will be the degree of its variation. The task of management, therefore, is to minimize and prevent variations from the planned procedure.

To do this effectively, three things are essential: First, a basis of comparison for each item; second, a common denominator that makes related elements comparable; and third, a method of visualization, in terms of the common denominator, that will compare and evaluate the different elements in such a manner as to emphasize exceptions to plan in proportion to the degree of their variation.

The use of the common denominator of repetitive manufacture is expressed thus: *"Since time is the basis of repetitive manufacture, all elements must be presented in their relation to time."* This denominator applies only to production management. Other functions and phases of management have other denominators, and, in still other cases, each item that is visualized may have a different base. Therefore, in order to visualize any single function of management, any department, or any management as a whole, on the same chart, it was necessary to use a basic denominator that would resolve all the others.

The basic denominator that naturally suggested itself was *condition*. This not only resolves time, quantity, and value, but any other denominator, factor or element, tangible or intangible, in management or elsewhere. *Condition*, therefore, as a basic denominator, is not an innovation, but is the application of a universal basis of comparison and measurement. Everything is in some state of condition. To be able to visualize present conditions is to be able to forecast probable conditions, and thus forward or prevent them.

Condition being all inclusive, it was necessary, in order to use it as a definite measure of comparison, to have several different degrees of condition. Four were segregated and relatively evaluated. These four degrees of condition, *normal, attention, emergency,* and *vital* are the standards of evaluation and measurement used for visualizing purposes.

The third essential of management, emphasized visualization, requires an unusual type of chart. It may be made in any desired form, provided it fulfills the requirements.

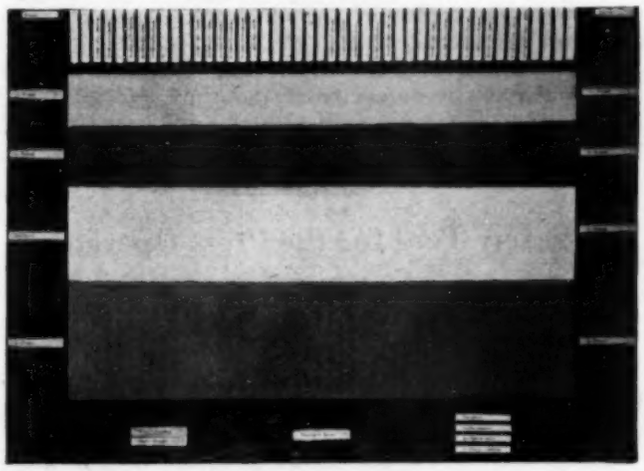
The chart that must be used has as its base the four degrees of condition, arranged as horizontal zones. Each zone has a distinctive color, and its relative importance is emphasized both by the intensity of its coloration and by its width. The effect of this arrangement is to attract attention first to the vital zone, and next to the emergency zone.

An abstract of a paper presented at a meeting of the Metropolitan section, A.S.M.E., on Feb. 7, at the Engineering Societies Bldg., New York City.

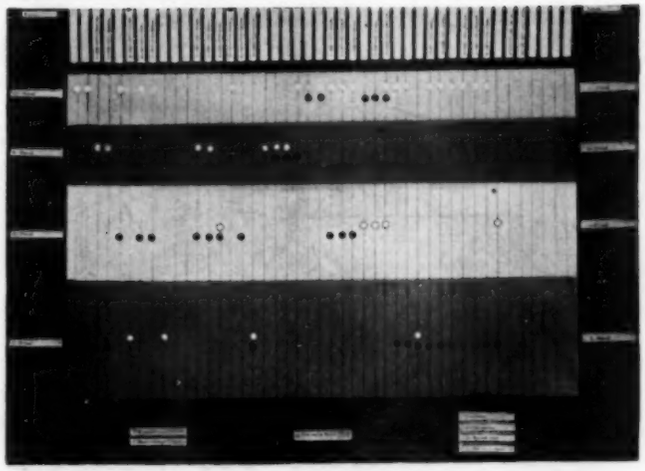
These four zones not only indicate different degrees of condition, but also the relative rank of the individual who functions within each of them. The operating zones fall naturally into the classification of clerical and supervisory. A normal item is purely clerical. If, for any reason, it ceases to be normal, and requires attention, a supervisor is the logical one to give it attention.

The original planning does not contemplate that any item will go into the two lower zones, thus, only exceptions to plan are visualized there. Such exceptions receive, first, the attention of a general supervisor, or of an assistant to the executive who is responsible for the application. If this fails to arrest the variation, or restore the item to normal, it receives the attention of the executive himself, at a time, and in a condition, provided for in the original plan.

The bare chart, with appropriate legends, acts as a common denominator and visualizes the planning. The top of the normal and the bottom of the vital zone are the extremes of the allowances of the plan. The two central zones represent stages in the plan, or increments of time, quantity, or progress between the two extremes that are proportioned to the authority and capacity of those responsible for them. Legends denoting what denominators are being used and what proportion of the whole plan is assigned to each zone are placed in their proper holders. The titles of 100 per cent of the items belonging to a particular department or function are placed across the top, and the whole represents a complete plan with three different degrees of exception, each apportioned to a different degree of authority.



The planned condition



The actual condition superimposed on the planned

The third rule of management by exception states that: *"Positive control demands the visualization of 100 per cent of all factors, 100 per cent of the time."* Such visualization is compulsory and necessary, because an exception cannot be detected until it happens, but if it is caught at the beginning of its variation it can usually be either controlled or discounted. The tendency to stray is shown by the chart, which, therefore, directs what action shall be taken.

The selective zone principle apportions the responsibility accurately, not by dividing the items numerically, but by dividing each item and observing the laws of specialization, division of effort, and responsibility. The net result is that the law of exceptions is amplified so that it may be read: "Efficiency in management is greatly increased by confining the attention of each individual solely to those matters within his own jurisdiction which vary from routine, plan, or standard."

The second function of the chart is to visualize the actual condition of the two elements which constitute each posted item, and to contrast them with their planned condition. Actual condition being dynamic, the means of visualizing it must also be dynamic. For this purpose, two separate, but related, elements of each item are indicated, one by a white indicator, the other by a black one. These related elements may be rough and finished, current and cumulative, time and progress, or any two dependent factors. The reason for indicating two factors is the simple rule that, "from two known terms, the third, or unknown, term may be found." This double indication does not require additional work or space, because they have but one title. The two indicators may have the same denominator or different ones.

The third function of the chart is to act as a measure of management. The actual condition of the two related elements of an item, as shown by the two indicators, contrasted with the original plan, which is the chart itself, gives the efficiency of execution, not only as a whole, but in four different degrees that represent the relative and actual efficiency of the individuals responsible for the different zones.

The creative instinct of the executive type rebels at repetition. Only the detail man is content, or even able, to follow a routine day after day, and he is not considered executive material. The last of the four rules governing exception management covers this point effectively. It reads: *"A department shall not post any chart that directs its activities or that visualizes the results it achieves."* This rule, like the others, is so simple that it requires no effort to observe it.

The chart applications, then, provide directions without comment and record failure with criticism. They also provide a pitiless publicity by an independent agency, which is both an incentive and a compulsion. There are no rules as to what must not be done or what shall be done, except the four referred to. The compulsion lies in the inevitable progress of the indicators from zone to zone when actual conditions varies from plan, and in the notification of the staff or the responsible executive when an exception occurs.

There can be no management without a manager, and no transfer of skill without ability, but, granted these, there is no comparison between the systematic and the exception methods in economy of labor, overhead, and material.

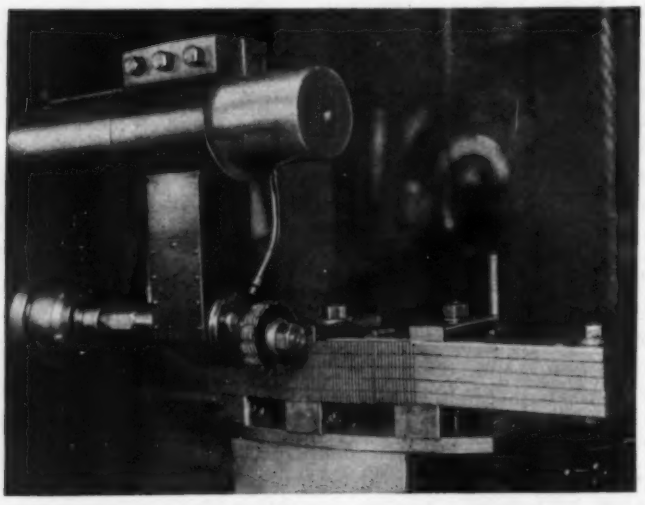
IDEAS FROM PRACTICAL MEN

The department, "IDEAS FROM PRACTICAL MEN," is devoted to the exchange of information on methods useful to the machinery industries. Its scope includes all divisions of the metal-working industry, from drafting room to shipping platform. Descriptions of methods or devices that have proved their value are carefully considered, and those published are paid for. The rates are from a minimum of five dollars upwards, depending upon their merit.

Device for Milling Locomotive Quadrants

BY MAX SCHWARZE
Foreman, Milwaukee Shop,
Chicago, Milwaukee, St. Paul & Pacific Railroad

IT IS difficult to mill the teeth on a locomotive throttle quadrant that has a straight end shank because this shank strikes the outboard bearing support of the milling machine arbor, and prevents milling the entire radius up to the shank of the quadrant. With the device shown in



Device mounted on milling machine overarm shown cutting locomotive throttle quadrants. It may also be used for cutting reverse lever quadrants

the illustration, throttle quadrants or reverse lever quadrants of any desired radius and with either straight end shanks or plain radius can be milled successfully. The feature of the device is a gear box supported on the overarm of the miller. Gears are used in the box, to provide the possibility of cutting larger radii than the milling machine originally would permit.

In the set-up shown in the photograph, the cutter spindle is set 3 in. to the right of the machine spindle center line, and in this way enough clearance is obtained to cut quadrants up to 48 in. in radius. For larger quadrants, a larger gear box with heavier gears is required. The particular gear sectors being cut have a radius of 22 in. Most important of all is the fact that the cutter is on the outside of the gear box on an extended shank so that the entire quadrant can be milled without interference of its shank.

When throttle quadrants are being made the blanks are first put on the slotter and the radius cut to the proper dimension by means of a templet. The blanks are then all dowelled together and are cut in the milling machine at one setting. As many as six or more blanks can be milled at once when a cutter of four or five teeth is employed.

When the appliance is used for cutting reverse lever quadrants, a special plate is needed to hold the blanks and the rotary milling machine table must be mounted on a special extension plate. Four of this type of quadrants can be milled at one setting. Blanks for these quadrants as made in the Milwaukee shops are rolled to radius from 2-in. square steel stock in a boiler-shop plate roller, after which they are put on the grinder and the sides ground parallel. In milling these quadrants a single tooth cutter with a flat somewhat wider than the tooth to be cut is used. The purpose of this flat is to form the radius of the quadrant, thus rectifying any error in radius.

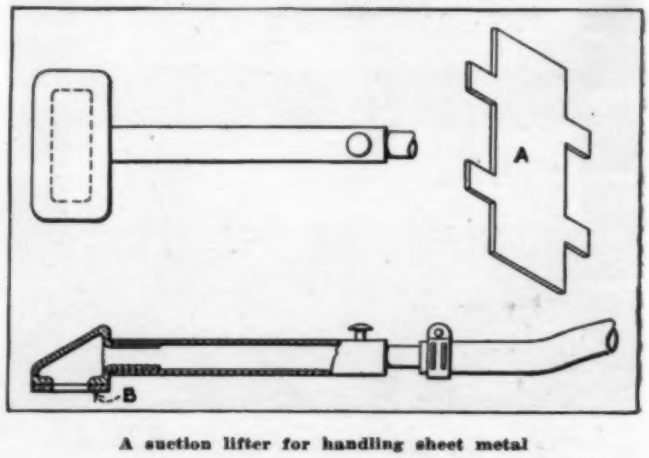
No planing of the sides of the blanks for the throttle lever quadrants is necessary as these are cut from flat steel stock on an oxygen cutting machine and are trimmed to final shape in a slotting machine as mentioned.

A Safety Tool for the Press Operator

BY A. R. KLING
Chief Tool Designer,
Plainfield Manufacturing Company

A recent accident in our press department called attention to the fact that the operators were not equipped with the proper safety devices.

Pieces such as the one shown at *A* are bent in a die having a nest for locating the work. In placing the work in the die by hand, the operator lost two fingers through inability to get his hand out of the way quickly



A suction lifter for handling sheet metal

enough after the press had been tripped. The fault was entirely his because he had been furnished with a bulb-operated suction tool for picking up the work and placing it in the die. He gave as a reason for not using the tool, that it was too cumbersome and tiring to the finger muscles.

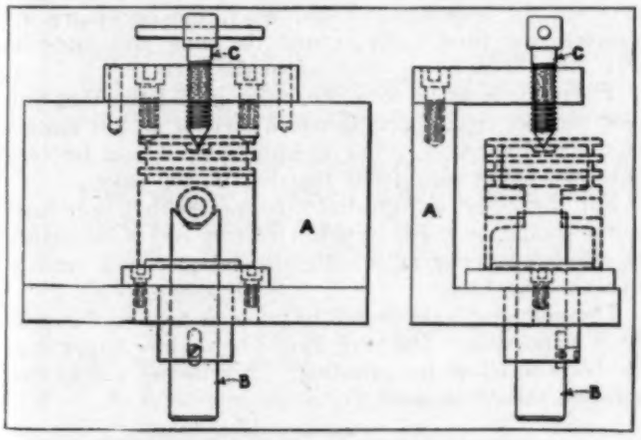
To overcome these objections, the tool shown in the illustration was designed at the request of the safety engineer. It consists of a very light nozzle, shaped to the outline of the work and faced with rubber at *B*. The nozzle is attached to a piece of thin tubing having fitted to it a valve similar to that of an air gun. The tube is connected to an exhaust, or suction, line by a flexible hose. By pressing the rubber-faced nozzle on the work and at the same time squeezing the valve button, the work is sucked against the rubber face of the nozzle and can be lifted up and inserted in the die. When the pressure is released from the valve button, the suction is cut off, and there is enough leakage between the nozzle and the work to permit the tool to be withdrawn, leaving the work in the nest of the die. Thus the work can be placed in the die without danger of injury to the operator, and without decrease of output.

An Improvised Fixture for Boring Piston-Pin Holes

By George Wilson

We had an order for an odd lot of pistons, and the improvised fixture shown in the illustration was made to hold them while the pin holes were being bored.

The angle plate *A* was provided with a pilot to fit the



Fixture for boring piston-pin holes

open end of the skirt. To align the pin bosses with the spindle of the lathe, on the faceplate of which the fixture was mounted, the plunger *B*, having a V in its upper end, was fitted to a hole in the lower leg of the angle plate. A slot in the side, engaged by a dog-pointed screw, located the plunger so that the V was in line with the spindle. By pushing the plunger up against the pin bosses, they were brought into proper alignment. After the bosses had been aligned, the piston was clamped by the screw *C*, the point of which entered the countersunk center in the top.

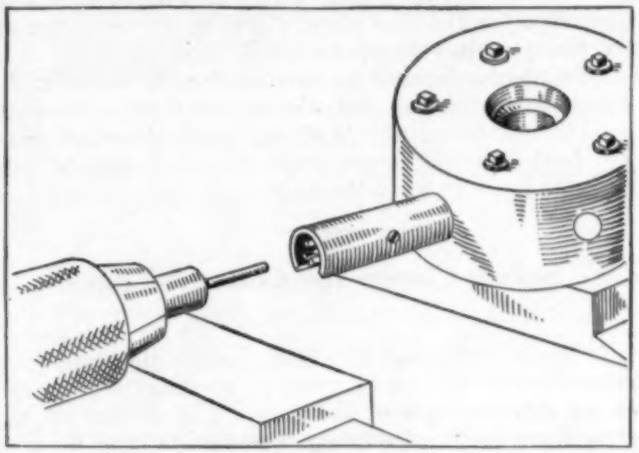
A center drill held in a chuck in the tail spindle served to spot the holes, which were then bored and reamed. The time per hole was 10 minutes.

Chip Shields for the Turret Lathe

By Charles H. Willey
Asst. Plant Supt., Hoyt Electrical Works

Sometimes a very simple device, such as a shield to prevent chips from flying, will save time and money. One of our turret-lathe operators has fitted up the hollow mills on his machine with shields like the one shown in the illustration. They are very convenient, and put the chips where they belong.

The shields can easily be cut from pipe or tubing, or



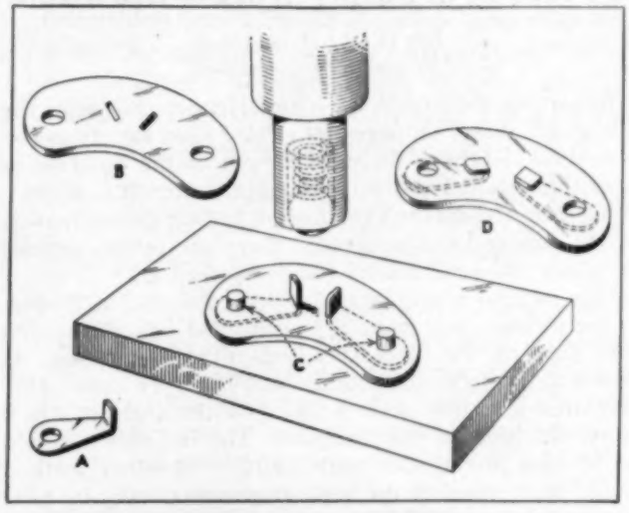
A shield to prevent chips from flying

made by rolling up $\frac{1}{16}$-in. sheet brass with an opening left at the bottom to allow the chips to fall through. The invention of these shields was recognized by our safety committee, which rewarded the operator for his precautionary measure to prevent hot chips from flying about, and possibly injuring someone's eyes.

Assembling Fixtures for Terminals

By Charles H. Willey
Asst. Plant Supt., Hoyt Electrical Works

The illustration shows a fixture for assembling terminals into the fiber pieces used in the bases of electrical meters, and on which to lock the screw heads by soldering. The terminals, one of which is shown at *A*,



Press fixture for assembling terminals

are of 0.020-in. soft brass and the ears go through slots in the fiber piece *B*. The terminals are placed over the pins *C* in the base of the fixture, the fiber piece being placed over them, and the ram of the press is brought down.

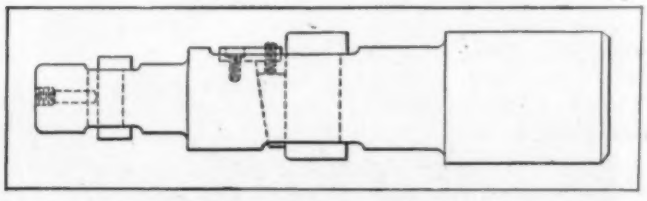
A steel ball of the proper diameter is held in a hole in the ram, the metal at the outer end of the hole being spun over to retain it. The ball is backed up by a stiff helical spring. As the ram descends, the ball comes in contact with the protruding ears of the terminals and bends them outwardly. As the ram continues its descent, its flat face coming in contact with the ears, flattens them down on the fiber piece. Meeting the resistance of the fiber, the ball disappears in its hole.

One of the finished assemblies may be seen at *D*. Formerly, a hammer and a piece of faced steel were used for the operation. With the fixture just described, and used in a foot-power press, the production is four times as great as when the hand tools were used.

Safety Clamp for Cutter Wedges

By Ernest Foldvary

In boring bars fitted with blade cutters, the cutters are generally held in place by wedges, providing they are not at the extreme ends of the bars. The wedges do not always provide a satisfactory means of holding the cutters, because they are liable to be worked loose by vibration caused by chattering.



Clamp for holding a cutter wedge

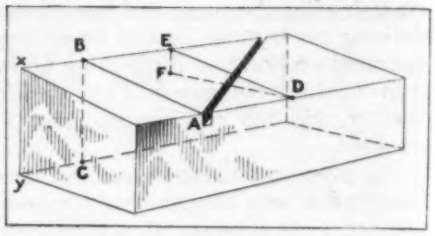
The illustration shows a safety clamp, one end of which bears on the large end of the wedge in a boring bar. With a properly fitted wedge so held, there is very little danger of its working loose.

A Problem in Shaper Work—*Discussion*

By D. R. Dunstone
Hetton-le-Hole, England

Regarding the article by James Henderson, under the title given above, on page 294, Vol. 71, of the *American Machinist*, I believe the working out of the equation to be arithmetically incorrect, althought the result is correct. While Mr. Henderson's method of finding the inclination of the shaper head is correct, there are other methods by which the same results can be arrived at.

One method would be to draw the line *AB* at 90 deg. to the groove, and from *B* to draw the line *BC* on the rear face of the block, perpendicular to the base, as shown in the accompanying illustration. The angle *ABC* measured by a protractor would give the angle to which to set the head of the machine. The inclination would be 90 deg. minus the angle *ABC*. Another method would be to calculate the angle trigonometrically by solving the triangle *DEF*, although this method would cause unnecessary complication. *DEF* is a section at right angles to the groove.



The block to be grooved

A draftsman would overcome the difficulty by drawing a plane section of the solid through a line perpendicular to the groove. Considering that the groove is shallow, compared to the edge *XY*, and having the vise turned to the correct angle, why not set the head by moving the tool down that edge? This job is one that causes considerable trouble, due to the fact that there are such a variety of ways of accomplishing the same end.

Making Tight Plug-Cocks

Q. We are making brass cocks of conventional design that must be tight under a water pressure of 100 lb. per sq.in. and still turn freely. We do not seem to get them tight with any degree of regularity, as a large percentage of them leak, even after considerable grinding. Can you give us any information that will help us?

A. There are two reasons for leakage. The first is that in turning the plugs the tool naturally drops into the slots that form the passages for the fluid. Thus the plugs are smaller in diameter about the slot. The second reason is that in reaming the taper holes in the bodies, less resistance is offered to the reamer opposite the inlet and outlet openings. Consequently, the bodies are stretched somewhat, leaving the holes slightly oval and largest opposite the openings. Thus, when the cocks are assembled, the fluid leaks around the plug and finds its way into the opposite opening in the body.

The remedy is to turn the plugs in a lathe that will hold the tool rigidly, and in which there is no lost motion in the tool carriage. The finishing cut should be very light and made with a tool that has no top rake.

For the body, a right-hand reamer with a left-hand spiral should be used. Such a reamer offers resistance to the cutting instead of digging in, and will ream a smooth, true hole.

The plug and body should be made as near to the same taper as possible. The plug should be slightly larger than the body to allow for grinding. In grinding a very fine abrasive should be used.

Straightening Iron Plates

Q. In our work we have to straighten some $\frac{3}{16}$-in. iron plates 4x6 ft. in width and length, respectively. So far we have not been able to do this work successfully. Can you suggest a method?

A. We know of no easy way to straighten plates of the dimensions you mention. To do such work requires a large amount of skill and experience. Briefly, the bulges are caused by the edges of the plates cooling before the inner parts. Rolling between flattening rolls will remove most of the bulges. However, the only way really to straighten the plates is to lay them on a heavy surface plate and stretch the flat parts—not the bulges—by peening with a heavy hammer having a slightly rounded face. Commercially-flat plates can be purchased.

Metal Pickling

General Principles and Control

CAREFUL control of pickling-room conditions is far more widespread than it was a few years ago. Most pickling departments of today are equipped with recording thermometers, titrating sets, and similar equipment; few pickling foremen are ignorant of how to make a volumetric analysis. The result is good pickling and consequent acid saving. Good pickling should be economical of acid; despite the aid offered by agitation, aeration, temperature control, depolarizing compounds, and similar helps, the necessity remains for maintaining the acid content of the bath at exactly the right figure. The use of measured capsules of alkali in a crude titration is better than nothing, but this is none too accurate for proper economy of acid. Control of the acid content of the bath is fundamental.

Measured on a basis of acid consumed, tin plate is probably the largest single class of material pickled. Because of the enormous amounts of tin plate pickled annually, there has been more incentive to study control and economy. Moreover, so seriously does the quality of the cleaning affect the cost of tin-coating that it may cause manufacturing losses which will mean the difference between ultimate profit and loss.

Principles used in controlling tin-plate pickling are basic, and can be applied readily to other kinds. Some of these principles are:

1. Steam and air as aids to scale removal are cheaper than acid.

2. A fresh solution will pickle clean; an old solution will leave stains.

3. With almost no exceptions, the fastest pickling is the best pickling.

From these principles, a number of good rules of practice have been derived. They can be followed in any sort of acid cleaning.

1. A pickling machine that will raise and lower the piece steadily at from 20 to 30 strokes a minute should be used. This keeps the bath air-saturated, agitated, well-mixed, gives a mechanical washing action, speeds up scale removal, and smooths out dissolving to prevent pitting and etching.

2. Heat has been found cheaper than acid; that is, the efficiency of scale removal in pounds of acid per ton of steel cleaned can be raised at less cost by working pickling baths at high temperatures, using steam, than by increasing the acid concentration in cold baths. It is best practice to work at the highest practical temperature up to 180-190 deg. F. in fresh baths of acid, and on up to the boiling point when an old bath is to be "killed."

3. The shortest possible time should be consumed in loading and unloading. Short-time pickling is the best way to avoid embrittlement and pickle blistering. Quick pickling is cheapest, cleanest, and far more likely to avoid etching. Black tin-plate (hot-rolled steel sheet or strip) can be pickled properly in from six to seven minutes. Two tanks are used, the immersion being three minutes in each tank. This is a reasonable amount of time to allow for loading of racks.

4. Two tanks, one after the other, should be used to assure clean pickling. By the time the finishing tank gets "heavy," a fresh solution can be made up in the first tank, and the direction of the process reversed.

5. With the limits of temperature and time of immersion fixed, the best concentration of acid that will correspond to these conditions can be determined readily for the class of product being pickled. The acid concentration should be the minimum for cleaning the article the required amount in the time interval and bath temperature used. This will give the greatest economy of acid. A good set of conditions for most sheets, strips, or articles made from them when a pickling machine is used is: temperature, 180 deg. F.; bath, three minutes in each of two tanks; concentration, 3 per cent sulphuric acid; limiting gravity of the old bath, 20 deg. Baumé.

6. Use a good inhibitor. A great deal has been written on inhibitors, so it need only be said that it is best practice to use inhibited pickling baths.

Since no matter what the class of work may be, the conditions for good pickling hinge upon each other, they can be determined and fixed for control for the foreman with the aid of simple tools. All he needs is a thermometer, a burette, a clock, and a hydrometer, and he can pickle metals accurately and well.

Contributed by C. A. Crawford, Research Engineer, International Nickel Company

© American Machinist

American Machinist

Editors: KENNETH H. CONDIT AND FRED H. COLVIN

Vol. 72 NEW YORK, FEBRUARY 13, 1930 No. 7

An Anomaly in Installment Buying

A DISPATCH to *The Business Week* says that the Bank of England has departed radically from traditional policies by giving monetary support to companies engaged in financing the purchase of production equipment on installments. Here is something for bankers, equipment builders, and equipment buyers in the United States to think about.

The principle of buying on installment, or "from income" as some advertisements phrase it, has been widely and successfully applied to the distribution of automobiles, musical instruments, household appliances, and other objects largely in the class of consumption goods. But builders and buyers of industrial machinery and equipment have fought shy of the installment plan. Just why, is hard to understand, because production machinery that will pay for itself in a period measured in months looks like a far safer object for the application of the installment plan than do the automobile and the radio. If the safeguard of repossession were of vital importance in the case of production equipment, then one could understand the failure to apply the installment plan, because a repossessed generator or heavy machine tool would be hard to dispose of. But what little experience we have shows that repossession of such equipment is almost unheard of, which is just what theoretical considerations would lead one to expect.

The dispatch referred to says that the Bank of England stepped into the breach because English manufacturers protested lack of funds to purchase the modern equipment that was sadly needed. Apparently the English financial leaders have recognized an opportunity to accomplish modernization that seems to have been overlooked by the Americans who assembled at the call of the President to overturn, or at least ameliorate, the business cycle. Perhaps a proposal to stimulate modernization of equipment through installment financing was made at those meetings, but if so it received little attention from the press.

Analyzing the High Executive

JOB analysis is extremely helpful in improving factory management. It would be more helpful if it could be focused on the works manager, the superintendent, and the sales manager rather than on the lathe hand, the stock clerk, and the assembler. If one man in the ranks—or a dozen, for that matter—fails to have a complete understanding of his job, there is certainly some inefficiency in his immediate neighborhood, but the extent of it is probably not a very serious matter. If, on the other hand, several high executives are equally foggy on the limits of their respective responsibilities, complete failure of the whole enterprise is not unlikely.

Strange as it may seem in this day of modern management, it is a fact that many a sales manager looks at the production department as a necessary evil. Some one, of course, must make the things his salesmen dispose of so handsomely, and so profitably. And just as many hard-boiled, practical superintendents and production managers look with some contempt on the "hot air artists" of the sales department.

In a company of moderate size the owner or manager must watch for any such manifestation in his department heads and knock it out of them at once. They are usually so close together that remedial measures are not difficult. But in the big corporation the problem is much harder. The men at fault are more expensive, and they may be more obstinate in defense of their opinions.

In either case a careful analysis of each man's job, and his responsibility in the profitable operation of the whole company, would do much to prevent the trouble from starting, and even to cure it after it has made some headway. More attention to the important positions, at the risk of slighting those at the other end of the scale, would be highly beneficial in any organization.

*

A Warning to Trade Associations

THE recent statement of the Assistant to the Attorney General that he intends to proceed against certain trade associations is fair warning to those associations that have been skating on thin ice to get on safe ground. Apparently the abuse that has aroused the Department of Justice is the old evil of price-fixing. In view of the frank statement mentioned no association that gets into trouble can plead that it was not forewarned.

SHOP EQUIPMENT NEWS

"SN" Plate Slitting, Trimming, and Beveling Shears

LONG, clean, straight cuts—either square or beveled—can be made at exceptionally high speed on the "SN" plate slitting, trimming, and beveling shears, introduced recently into the United States by the United Machine Tool Corporation, 75 West St., New York, N. Y. Special operations include cutting bevels of 18 deg., 30 deg., and over on the end of plates for welding, with the plate lying flat in the machine. Fig. 1 is a full-size, unretouched photograph of a beveled edge and illustrates the smoothness of the cut. It should be noted particularly that there is no broken area.

Such an edge is produced with minimum power consumption by means of one continuous, automatic, rotary cutting operation. The rotary upper knife cuts against the stationary lower knife while the material is held fast. Travel of the upper rotary knife is effected by means of a heavy block chain, which pulls the rotary knife carriage across the machine. The knife has no independent motion. Heavy top and bottom bolsters of forged steel absorb shearing stresses. These bolsters are assembled rigidly with a heavy round guide shaft for the knife carriage. It is possible to start or stop the carriage by hand at any point of the travel on machines of capacities up to $\frac{5}{8}$-in. plate, whereas on the larger machines push-button control is a feature. This type of control can also be furnished on the lighter models at extra cost.

Three types of these shears are available. The model B is throatless, and the length of the lower knife is equal to the maximum length of the cut. Small types are furnished in this design only. Model DB has throats in the housings for cutting long narrow sheets lengthwise. Any length of cut is obtainable and in a width corresponding to the throat depth. The third model, SB, is intended for trimming. It has a throat on the knife carriage, but is built with throatless housings. The width of cut is limited to the depth of the throat on the carriage. Specifications for these three types are listed in Tables 1 and 2. An important feature of the line is that these machines can be purchased at a little additional cost for extra bed length, inasmuch as the motor, operation, and cutting means remain the same.

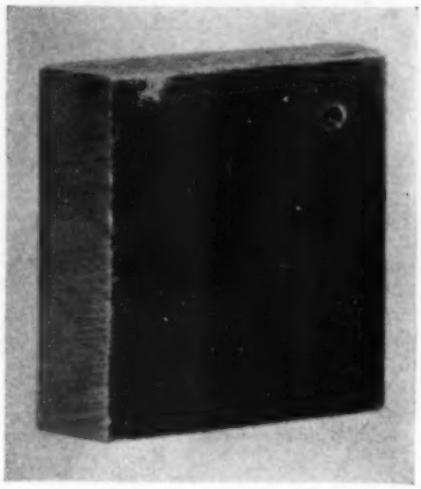


Fig. 1—Full-size unretouched photograph of a beveled edge on a $\frac{1}{2}$-in. plate cut at 8 ft. per minute

No flywheels are embodied in the design of these plate shears, thereby eliminating continual idling when not cutting, as well as all mechanical engaging parts. Such construction saves

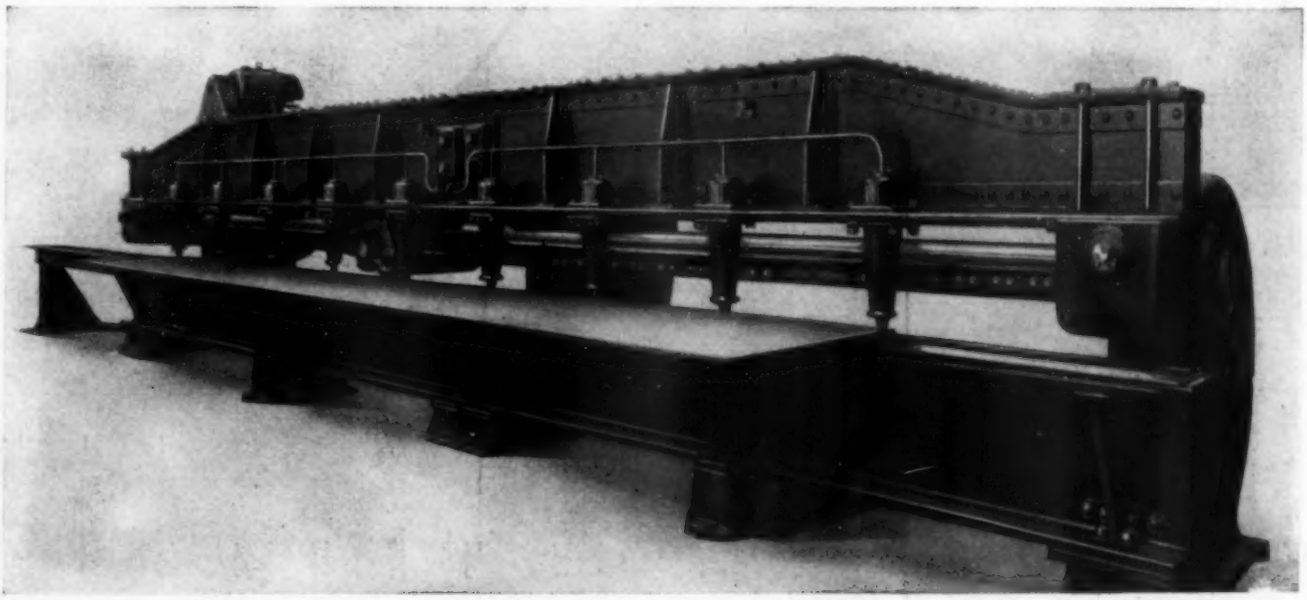


Fig. 2—"SN" Model DB-20 Plate Shear, which will shear plates up to $\frac{1}{2}$-in. in thickness by 160-in. wide at one stroke. A heavy block chain pulls the rotary knife carriage across the machine. Approximate cutting time, 25 seconds. Push-button control and pneumatic hold-downs are included in the equipment. the depth of throat is 16-inches

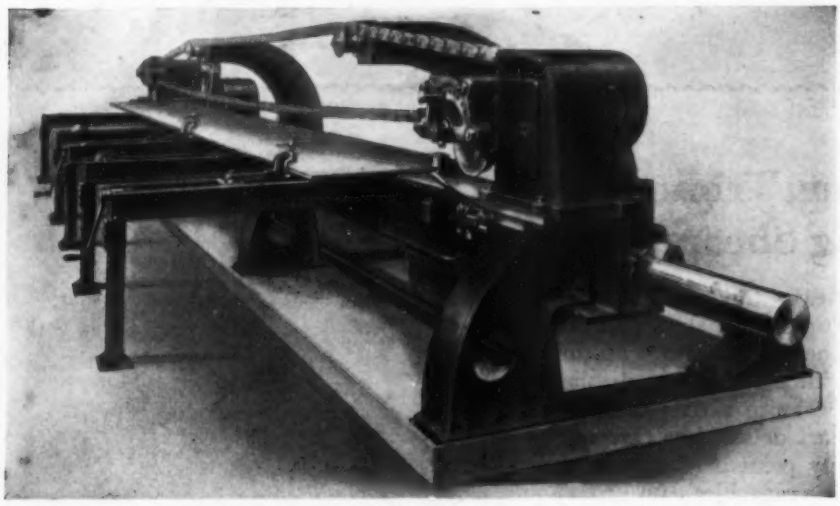


Fig. 3—"SN" Model SB-20 Trimming and Beveling Shear for cutting plates up to ¾ in. in thickness by 32 ft. in length at one stroke. The greatest width taken is 12 in. Speed of complete cut for plates ¾ in. thick, 60 seconds

power, and saves time for engaging and disengaging. Any of these machines can be started and stopped at any point while cutting.

It is not necessary to tilt the plate for beveling or scarfing the edges, since a rotary knife inclined on an angle is employed. When necessary, this knife may be changed in two or three minutes. For each desired angle a suitable knife with guide and shaft is necessary. Knives with an 18-deg. angle are furnished for beveling, and 30 deg. for scarfing. For special purposes, knives up to 40 deg. can be furnished. The usual stripping devices are not necessary in the operation of the machine. The hold-down equipment serves merely to hold the plate fast and in position. Hold-down jacks are arranged in groups and are manipulated readily by hand. The heavy models, DB-20 and up, are equipped with pneumatic hold-down jacks.

The rotary upper knife is subject to only slight wear, and may be reground many times. On special order, SN shears may be equipped with top and bottom rotary cutters as an auxiliary. These are carried by a cast-steel frame attached to the back of the machine. Special cutters are furnished, if desired, for either straight or bevel cutting. It will be noted that the SN trimming and beveling shear is supplied without an upper bolster. The rotary knife cutter is designed with a throat, the depth of which determines the width of the material to be sheared off.

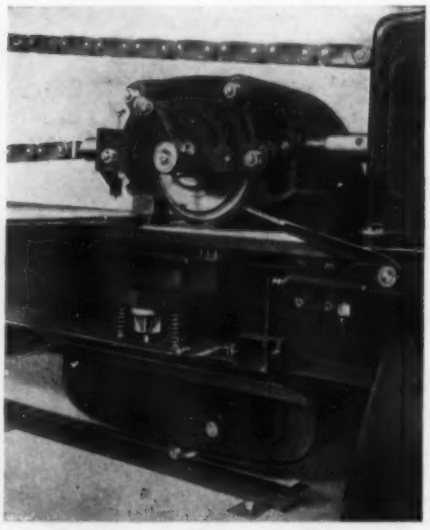


Fig. 4—Close-up of the "SN" Trimming and Beveling Shear, Model SB, showing the rotary knife carrier and hydraulic hold-down

Avey No. 621 Texdrive Sensitive Drill

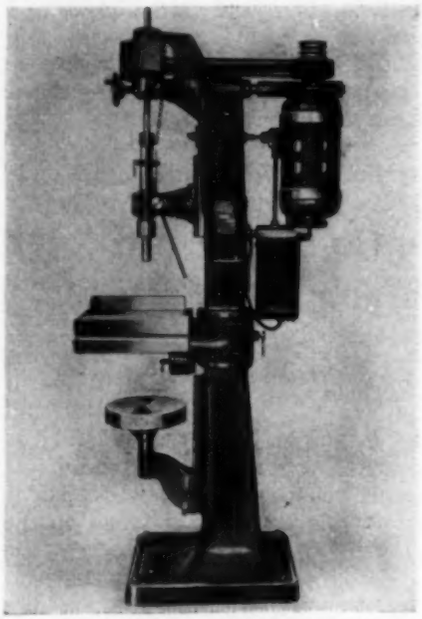
Texrope drive has been applied to the sensitive drilling machine designed by The Avey Drilling Machine Company, Cincinnati, Ohio. This machine, known as the No. 621, has a four-speed motor, double fan-ventilated. The motor is adjustably mounted on the back of the column and drives the spindle through Texropes. Two sets of sheaves provide a high and low range of speeds, there

Table 1—Specifications of Models B and DB Standard "SN" Plate Shears

Model	B-3	B-5	DB-8	DB-13	DB-16	DB-20	DB-25	DB-30
Capacity plates up to, in.	⅛	5/16	5/16	½	⅝	¾	1	1 5/16
Length of cut, in. (at one stroke)	100	100	120	120	120	160	160	160
Depth of throats of housings, in.	...	...	2	16	20	16	16	16
Hp. (direct-gear drive)	2	3	7½	15	20	30	50	60
Speed of complete cut, seconds	5	10	12	15	15	25	25	25
Overall Dimensions:								
Length	13'2"	15'	16'6"	15'7"	19'	25'	27'	28'6"
Width	2'	5'	5'3"	5'7"	6'7"	6'	8'	9'3"
Height	5'6"	6'	5'5"	7'4"	8'	9'3"	11'	11'
Approx. net weight, lb	2,900	4,400	7,100	14,300	21,200	28,000	58,500	88,200

Table 2—Specifications of Standard Model SB Trimming and Beveling Shears

Model	SB-3	SB-5	SB-8	SB-13	SB-16	SB-20	SB-25	SB-30
Trims or bevels plates up to, in.	⅛	5/16	5/16	½	⅝	¾	1	1 5/16
Length of cut (at one stroke), ft.	32	32	32	32	32	32	50	50
Widest strip to be cut off (depth of throat of knife carrier), in.	12	12	12	12	12	12	12	12
Hp. (direct-gear drive)	2	3	7½	15	20	30	50	60
Speed of complete cut, seconds	20	40	40	50	50	60	90	90
Approx. net weight, lb	...	...	19,800	20,175	34,300	41,450	83,775	117,500

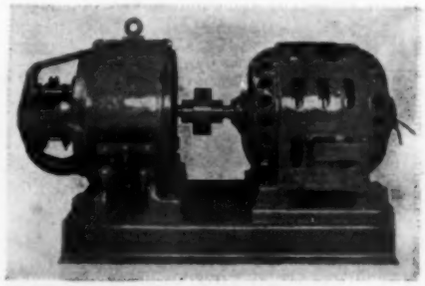


Avey No. 621 Texdrive Sensitive Drill

being eight in all. This number is desirable in a toolroom drill or wherever a large variety of work is being handled. The motor speeds are changed instantly by means of a lever at the front of the column. Overload and low-voltage protection are furnished, together with a reset relay.

Reliance Motor-Generator Sets With Welded Steel Bases

Heavy steel plate bases, electrically welded together, are now standard on the motor-generator sets manufactured by the Reliance Electric



Reliance Motor-Generator Set with a Welded Steel Base

& Engineering Company, Ivanhoe Road, Cleveland, Ohio. The tops and ends of the welded base are completely closed so that no dirt can collect underneath. The pads upon which the motor and generator rest are lined up horizontally and vertically by using the machines themselves as patterns for doing the aligning. Such shims as are needed are placed between the pads and the base. Horizontal alignment is maintained by the use of tight-fitting dowels. These are driven into the pads at two diagonally opposite feet of each unit. One or both units may be removed from the base without the alignment being disturbed.

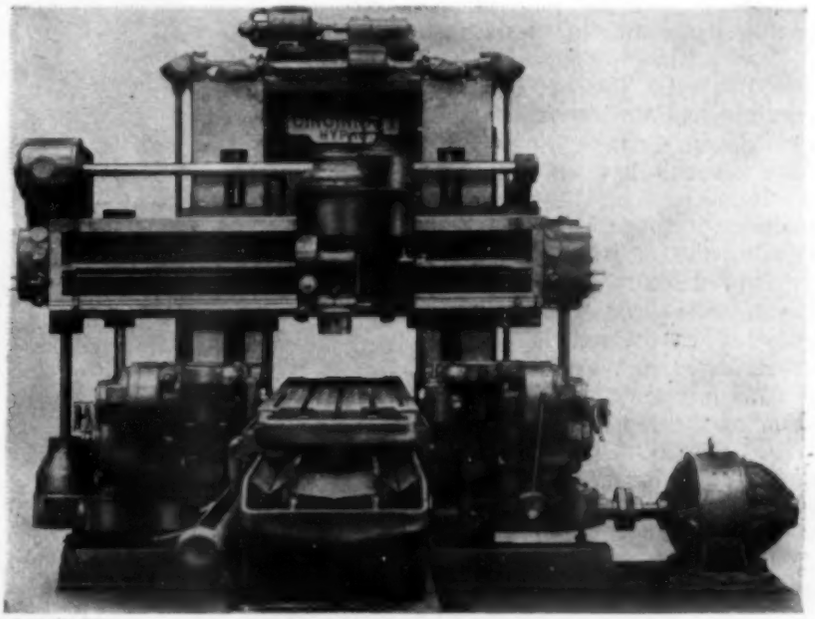
Cincinnati "Hypro" Planer-Type Miller

REQUIREMENTS for high production milling are met in this "Hypro" planer-type miller designed by the Cincinnati Planer Company, Cincinnati, Ohio. Independent movements of the head, spindles, and table have been provided. This enables the operator to feed one head and rapid traverse another. Large savings in set-up time can be effected on the machine, it is claimed.

The bed and table have forced lubrication supplied to the ways by a pump driven by the same motor that drives the table. Proper lubrication is thus insured at all times. The bed is twice as long as the table, thus eliminating overhang. Box type construction is used for the table to prevent distortion when clamping large castings. To prevent the table from lifting, a table clamp and an inner guide are supplied. Chip slots are milled in the bottom of the T-slots at intervals to make it easy to clean these T-slots. The table end is provided with a special pocket. This pocket serves several purposes. First, it will catch chips that would fall from the end of the table, and, second, it provides means for clamping the work for the full length of the table.

The drive to the table is effected through a worm gear, herringbone gears in the bed, and a bull wheel and rack. Three teeth of the bull gear are always in mesh with the rack. The complete train of gears is flooded with oil, and the shafts that carry these gears revolve in bearings at the side of the bed, lubricated by forced feed by the same pump that provides lubrication to the ways. A 4 to 1 reversible, variable-speed motor furnishes the drive. There are fifteen different speeds available for the motor, and with the backgear, thirty speeds are provided. The feed range is from ½ to 20 in. per min., with a high speed return of the table at 20 ft. per minute. A control lever for changing from the milling speeds to the high return speed and also to neutral is placed conveniently to the operator's hand.

Wide faces are used on the up-



Cincinnati "Hypro" Planer-Type Miller

rights, together with long bearings. These uprights are bolted and doweled to the bed. A tongue, machined integral with the bed, prevents the uprights from getting out of line. A box arch ties the whole together and minimizes vibration.

The four heads are independent of each other. It is possible to rapid traverse one or all of the heads at the same time. One head can be fed while another is rapid traversed. All of these movements can be operated from either the right- or the left-hand side of the machine. Should the operator jam the two heads together or jam the side head against the rail or the cutter against the job, no accident will result, since an automatic safety friction is provided. The complete operation of these heads is controlled by two levers. A single lever controls the direction of all heads.

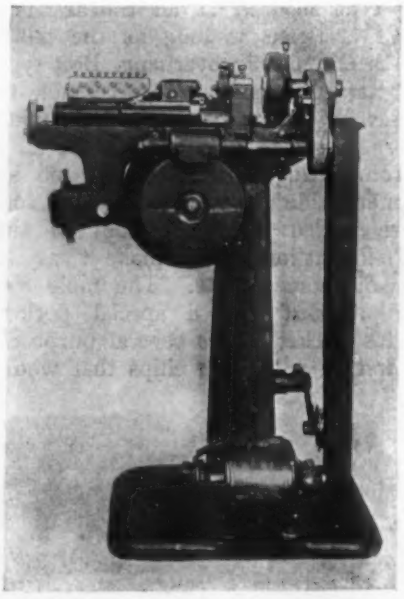
The milling spindle is driven by means of a worm and worm gear, which run in oil. The gear is large enough in diameter so that the milling cutter will generally be smaller. Two sleeve bearings fitted with roller bearings are provided on the gear. A two-speed box is provided to give two independent speeds at all times. One motor drives the spindle in the two rail heads and the other supplies power to the two side heads. These heads are designed to utilize 50 hp. The quills have a vertical adjustment of 9 in., power feed and rapid traverse.

The rail is provided with a narrow guide to carry the rail heads. This prevents the twisting of the rail and also assists in feeding the head across the rail. The rail itself has an exceptionally wide face and is provided with extra bearing surface against the uprights. It is clamped by a single turn of the rail clamping device. A square is placed on the end of the rail and with one turn it is clamped securely enough to take any cut. The elevating clutch is disengaged when the rail is clamped. For raising and lowering the rail, the same lever that controls the direction of the rapid traverse to the heads is used. One motor is used to supply power for moving the rail and rapid traversing the heads. Ball and roller bearings are used throughout the machine to reduce wear to a minimum.

Each motor is supplied with a three-position push button. These three push buttons are so interlocked that it is impossible to feed the table in any direction unless the spindles are revolving. If either of the driving motors should fail, the table motor will automatically stop. Push buttons are placed on both sides of the machine, and a start and stop button is placed on the control lever. The entire machine is controlled from the operator's position.

Langelier Automatic Taper Pin Swaging Machine

SMALL taper pins are swaged by an entirely automatic process on the machine illustrated. It takes wire from the coil, straightens it, swages the taper, and cuts off the pins to the lengths required at the rate of 35 per minute. The small end of the pins can be rounded if desired. This machine has been placed on the market by the Langelier Manufacturing Company, Providence, R. I. Wire from 0.020 to $\frac{1}{16}$ in. in diameter can be used, and pins up to $\frac{1}{2}$ in. long can be swaged and cut off. Other machines can be made to take larger wire and swage longer pins.



Langelier Automatic Taper Pin Swaging Machine

The machine consists of a frame attached to the top of a pedestal base, one small swaging head being mounted on the end of the frame. The remainder of the frame has a dovetail slide on the top face, upon which the shearing, feeding, and straightening heads are reciprocated by a double cam under the frame. The feeding and straightening heads are coupled together and act in unison. The shearing head is actuated by the feeding head, its travel being controlled by adjustable stops, one on itself and one on the frame.

Actuation of the feeding machanism is accomplished by a double cam and a pair of cam levers. These levers are connected to a pair of segment gears that mesh with a pair of racks located in the dovetail slide. One of the racks is connected to the feeding head and the other to a wire pinch lever in the feeding head. The cams are driven by a worm and wheel. Belt drive is furnished to the worm shaft, which is driven by a $\frac{1}{2}$-hp. motor attached to the base of the machine. A secondary pulley on the worm shaft is belt-connected to the swaging head pulley and drives it at 900 r.p.m. Both the cam levers and the segment gears have their fulcrums on the same shaft, and are connected under spring compression against a positive stop.

The two paths in the double cam are the same, except that an additional rise is added to one to actuate the wire pinch lever that grips the wire and feeds it ahead for each length of pin. Shearing of the pins after swaging is accomplished by a pair of shearing bushings, one being fixed in the shearing head, and the other in an oscillating segment gear that is actuated by a cam in the worm wheel. An adjustable stop at the rear end of the machine controls the length of the wire to be fed forward at each cycle. The swaging head is adjustable axially to control the length of taper to be swaged on the pin.

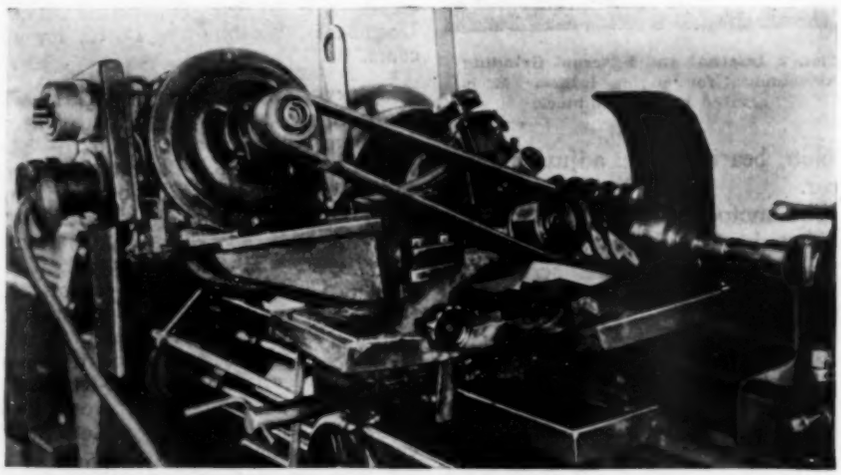
The floor space occupied is 2 by 3 ft., and the weight is approximately 900 pounds.

"Newark" Worm Grinding Attachment for Engine Lathes

A worm grinding attachment for use on 16-, 18-, or 20-in. lathes has been announced by the Newark Gear Cutting Machine Company, 69 Prospect St., Newark, N. J. The attachment grinds the threads of worms from about 1 in. in diameter to as large worms as the lathe will swing. The depth of thread ground ranges to about 1½ in. with an 8-in. wheel and to 2½ in. with a 10-in. wheel. The lathe cross-slide feed screw is used for controlling the depth. A feed screw for side cuts is provided with the attachment. Adjustments for both the helix angle and the pressure angle are provided. An index faceplate with notches for use in grinding multiple-thread worms is also available.

The grinding operation consists in taking a cut along the hardened worm thread, after which the operator runs back the attachment by reversing the countershaft, and then feeds sidewise by means of the feed screw. He follows this cycle with another cut, and so on. In reversing the lathe, play in the change gears relieves the wheel automatically from the worm. Usually one side of the worm is ground, finished, and then turned end for end and the other side finished. On left-hand worms, the cone belt is crossed, or the lathe reversed to give the same action.

As will be noted from the illustration, a motor to drive the grinding wheel is furnished. It is a high-speed, 1-hp., ball-bearing type running at 3,600 r.p.m., and is belted to the wheel spindle. Spindle speeds are changed by two sets of pulleys, which are furnished. A diamond dressing device mounted on the wheelhead is also provided. An armored flexible hose is furnished for attaching to a pump when wet grinding is to be employed. The net weight is about 250 pounds.



"Newark" Worm Grinding Attachment set up on an engine lathe

"Autostart" Model 1930 Grinders

A line of polyphase and single-phase "Autostart" Model 1930 buffers and grinders has been placed on the market by U.S. Electrical Manufacturing Company, Los Angeles, Calif. The polyphase types are available in sizes from ¾ to 5 hp. and the single-phase sizes from ½ to 2½ hp. On the first type the wheels carried range from 10x1 in. to 16x3 in. and on the latter type, 7x¾ to 14x2 in. The motors used are manufactured by the above company and are insulated with asbestos and impregnated with "Asbestosite." These motors are totally inclosed and are of the heavy-duty type.

Among the conveniences built into the grinder is the glass chip shield reinforced with heavy wire to give clear visibility with safety for grinding operations. Another convenience is that the flange is keyed to the shaft and can be held by a rod when the outside nut is loosened or tightened. Adjustment to give the proper guard clearance with the largest or smallest wheels used can be done quickly by means of the slidable mounting. A three-way, adjustable toolrest can be adjusted for all wheel sizes and to any position desired.

"Autostart" Model 1930 Grinder

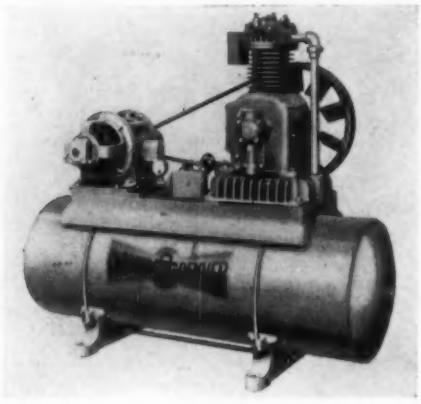
The buffers are essentially the same as the grinders, except that the speeds are higher for this class of work. The guards are permanently mounted and allow ample clearance for contact with the article requiring preparation. Both buffers and grinders are available for the usual circuits.

Gardner-Denver "A-C-E" Single-Stage Compressor

The air-cooled, single-stage compressor, just placed on the market by the Gardner-Denver Company, Quincy, Ill., is known as the "A-C-E" model, and consists of a 3½ x 4-in. duplex compressor, and a 5-hp. motor mounted on a cast-iron base on top of the air receivers. The compressor has a displacement of 26 cu.ft. per min., and operates at the rate of 600 r.p.m. This rate can be altered.

A feature is the inclosing of the suction and discharge valves in separate compartments. The valves are of a special type, heat-treated and ground disks being used. The use of compartments prevents the air from being heated when passing through the intake valves. An automatic or hand-operated start and stop control is furnished as standard equipment, and is operated in conjunction with the Penn-type pressure and moisture unloader.

Lubrication of the compressor is

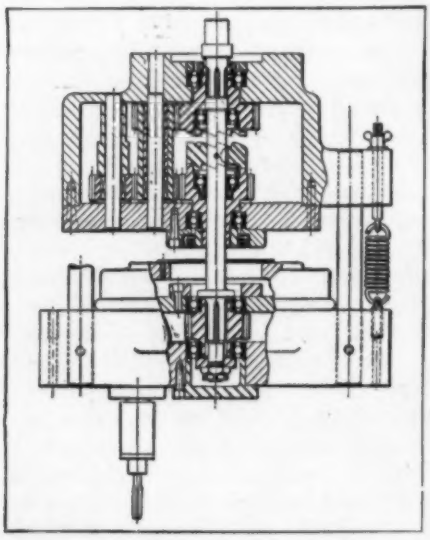


Gardner-Denver "A-C-E" Air-Cooled, Single Compressor

by splash, a plunger pump on the outside of the crankcase feeding the filtered oil to the troughs under the connecting rods. Other features of the compressor are the use of a V-type belt drive, a fan-type flywheel, Hyatt roller bearings, an after-cooler in the base.

Gray "Super" Universal Tapping Attachment

Adaptable to an ordinary drill press or one of the flanged-quill type, the "Super" universal tapping attachment has been placed on the market by the Gray Hub Company, 3171 Bellevue Ave., Detroit, Mich. Its construction is such that it may be placed in any position on the quill of the machine. In addition, the device is suitable for reversing a multiple-spindle tapping head attached thereto.

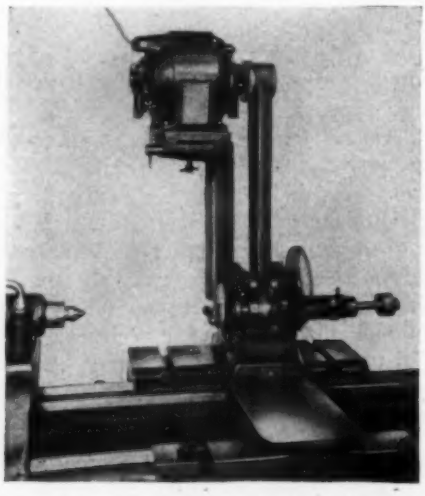


Gray "Super" Universal Tapping Attachment

Four sizes of the tapping attachment are available. Ball and roller bearings are used throughout, and the design is compact and rigid. Reversing is effected by means of double clutches, which are hardened and ground.

Clough Grinding Attachment for Engine Lathes

An external and internal grinding attachment for lathes from 12- to 18-in. swing has been placed on the market by R. M. Clough, Meriden, Conn. The attachment is carried on the toolblock and, in turn, carries a vertical bracket for the motor. The external grinder uses a 5-in. wheel running at a speed of 2,500 r.p.m. The internal grinding spindle runs in a long babbitt bearing in a block that is dovetailed and slideable in the base of the external grinder base. It can be taken off by turning back a clamping screw and sliding it out. The babbitt bearings are adjustable for wear.



Clough Internal and External Grinding Attachment for engine lathes. It is carried on the toolblock

The motor can be taken off the bracket by simply turning back a screw and drawing the screw out. The elevating screw in the front of the bracket is used for putting tension on the belts. Two belts are employed, one for the external and one for the internal grinding spindle. Two pulleys are placed on the motor shaft, one for the internal and one for the external grinding spindle.

TRADE PUBLICATIONS

ARC WELDING CAST IRON. The Westinghouse Electric & Manufacturing Co., has published bulletin No. 11 of a series on arc welding data, entitled "The Arc Welding of Cast Iron." Much metallurgical information is given, followed by the procedure for various classes of work. It also illustrates several types of arc welding equipment manufactured.

CLEANING MACHINE, METAL PARTS. The Colt's Patent Fire Arms Mfg. Co., Autosan Machine Division, Hartford, Conn., has published a bulletin on "Colt Autosan Metal Parts Cleaning and Drying Machines." The bulletin describes these machines and illustrates many different types as applied in various industries. General dimensions of the various sizes are also included.

PRATT & WHITNEY TOOLS. The Pratt & Whitney Co., Hartford, Conn., has published four bulletins on its tools as follows: Bulletin 318 on staggered tooth milling cutters; Bulletin 326 on half-side milling cutters; Bulletin 335 on spiral cut shell end mills of the National Standard, and Bulletin 458 on helical taper pin reamers.

PUDDLED WROUGHT IRON VS. THE ASTON PROCESS. The U. S. Department of Commerce, Bureau of Standards, has published Research Paper No. 124 entitled "Comparative Properties of Wrought Iron Made by Hand Puddling and by the Aston Process." The test results show there is no marked difference in the products of the two processes. The paper is well illustrated throughout and is replete with data and charts. It contains 38, 9x6-in. pages, and is for sale by the Superintendent of Documents, Washington, D. C., for 30 cents.

TURNING WITH SHALLOW CUTS AT HIGH SPEEDS. The U. S. Department of Commerce, Bureau of Standards, has published Research Paper No. 120, entitled "Turning with Shallow Cuts at High Speeds," by H. J. French and T. G. Digges. Relations were determined between the cutting speed, feed, depth of cut, and tool life for carbon and high-speed tool steels. Comparisons were made of tools of different forms and of tool life when cutting dry and with water or lard oil. Heat-treatment and chemical composition were also studied. The bulletin is replete with charts and diagrams. It is for sale by the Superintendent of Documents, Washington, D. C. for 30 cents.

NEWS
OF THE WEEK

Federation of Machinery Associations Planned at Washington Conference

AT THE Machinery Conference, held Feb. 3, in the Chamber of Commerce of the United States at Washington, the delegates unanimously agreed to go forward with plans for a national federation of machinery associations, and projected a committee to investigate ways and means. Carl A. Johnson, president of the Machine Tool Builders' Association and president of the Gisholt Machine Co., accepted the chairmanship.

Significant and welcome was the fact that the meeting began on time at 9:30 a.m. with full attendance ready for roll call. There were present presidents and secretaries representing more than twenty machinery and engineering associations, together with five or more representatives of the business and technical press. Each industry reported its condition and outlook, the majority of reports being marked by reasoned optimism and not a little enthusiasm. One manufacturer of knitting machinery reported his output sold for the year; refrigerating machinery reported the best volume of inquiries ever received; road-building equipment reported satisfactory business as a result of the Atlantic City Road Show; 55 per cent of the bakery equipment manufacturers expect business to be as good as that of last year, and one-half the remainder are optimistic; Diesel engine builders did not participate in the boom of 1929, their best year having been 1926; dairy and ice cream machinery builders look for no decline; business, though still off 20 per cent, is improving for woodworking machinery; one hydraulic machinery manufacturer reported new January business 20 per cent above January, 1929; the machine tool builders' association reports few cancellations, and the expectation of recovery by fall.

Ernest F. DuBrul, general manager of the Machine Tool Builders' Association and chairman of the Conference, stated that the peak of business in his industry was reached in February, 1929, but that a decline was not apparent until June. Based on his statistical studies, he prophesied that business would be as good in 1930 as in any year other than 1928 and 1929. He announced that 65 machine tool builders had committed themselves to plant betterment and replacement programs, averaging $50,000 each, and ranging from $5,000 to $300,000.

Dr. Baker, of the Chamber of Commerce trade association department, addressed the meeting on the activities and accomplishments of the National Business Survey Conferences. It is generally and reasonably hoped that, "a constant and current picture of business will grow out" of these conference which are "mobilizing business stabilization." He stressed the fact that these conferences are national affairs as projected by President Hoover, and not Chamber of Commerce activities.

Among the subjects discussed by the Machinery Conference were: Controlling the Trade-In Evil; Uniform Cost Accounting; Selling on Time; Industry Statistics; Firm Bidding; and the Thirteen-Month Calendar. A committee to confer with the Deputy Commissioner of Internal Revenue on Feb. 4, was appointed: subject — Machinery Depreciation Rates.

The Conference adjourned *sine die*, subject to the call of Chairman DuBrul.

* * * *

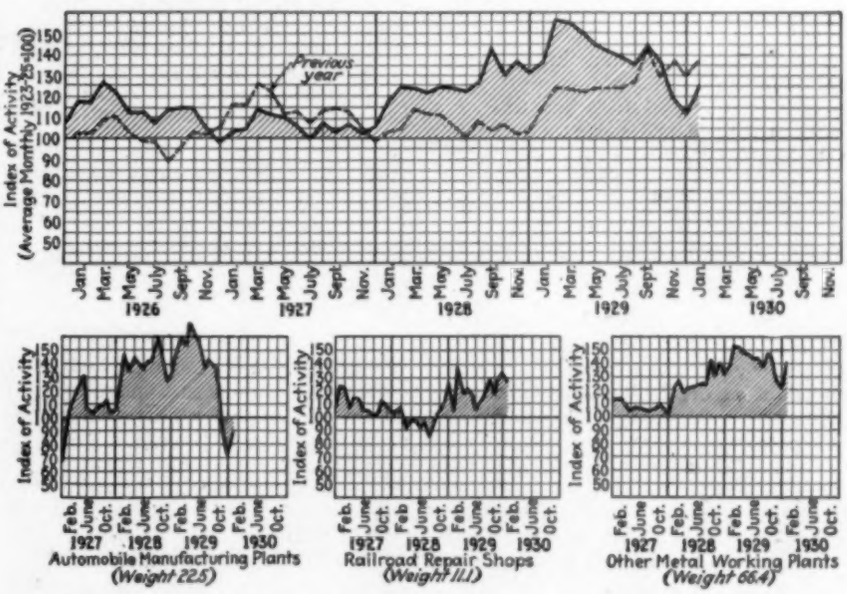
Metal-Working Plants More Active With Opening of New Year

THERE is no question but that the opening month of the year brought a material upward swing in the volume of operations in the metal-working industry. Preliminary data received by *Electrical World* on the consumption of electrical energy by a large number of the metal-working plants of the country indicate that the January rate of activity in these plants, after corrections are made for number of working days, was 9.5 per cent greater than that of December, but was still 4.7 per cent less than that of January last year.

The automobile industry, including the manufacture of parts and accessories, reported an increase in the rate of operations during January of 11.6 per cent, as compared with that of December, but was still operating on a plane about 40.7 per cent less than that of January last year.

Other branches of the metal-working industry, with the exception of railroad shops, present an even more favorable picture. The January rate of operations outside the automobile plants and railroad shops was 12.7 per cent greater than that of December and 5.5 per cent greater than that of January last year. The outlook is very good.

Activity in the railroad shops during January was 9.3 per cent less than that of December, but was 20.6 per cent greater than that of January last year. This is not surprising, however, when it is considered that the rate of activity in the railroad shops rose in November and December, and might naturally fall off slightly at this time.



BUSINESS · BAROMETER

Generally good conditions belie all predictions of even a temporary business recession

By THEODORE H. PRICE
Editor, Commerce and Finance, New York

ABOUT the only features of last week's record that can be regarded as affirmatively unfavorable are the declines in cotton and grain to new low prices for the present crops, plus the collapse of an amateurish corner in rye which was being run from a New England city. The rye corner was, however, merely an episode, and the decline in cotton and grain is in part a result of the lack of a complete understanding between the Federal Farm Board and the merchants whose business it is to handle these staples.

At the decline established, the buying was of the best character and a rapid distribution of the surplus stocks on hand now seems probable, while lower prices of course will be the most effective of all agencies in bringing about the average reduction upon which the Farm Board is insisting.

In the industrial field, a better market for manufactured products is also commencing to make itself felt. The same thing is true of the retail trade, and jobbers are busier than they were in supplying orders to fill in.

Bank clearings are still below last year's figures, but they are improving and it is claimed that they reflect a merchandise trade which is nearly as large as it was at the same time in 1929, if the lower level of prices and the decline in clearings arising out of stock market transactions are taken into consideration.

The steel industry enjoyed an astonishingly rapid and complete recovery during January, when the total ingot output was only 700,000 tons, or 15 per cent, less than that in the same month of 1929. A year ago, the great prosperity of the steel business was being acclaimed and a decline of 15 per cent does not justify assertions of severe depression now, especially as the output of the mills continues to increase and is approaching 80 per cent of capacity.

The automobile manufacturers are likewise stepping up their production and the tire industry is expanding slightly. Building is about equal to last year's level, and as some of the more abundant credit finds its way into the mortgage market, it is reasonable to expect improvement. Chain store sales in January continued their gains as compared with a year earlier.

Declining money rates throughout the world are encouraging signs of a return to normal after the disturbance created by the late stock boom. Since the market collapse, 28 reductions in central bank rates have been announced. The cut in the New York Federal Reserve rediscount rate to 4 per cent is recognition of the extent to which member banks are "out" of the Reserve, and of the wisdom of supporting business activity and commodity prices by making credit cheap and plentiful. In the circumstances further liquidation of the "frozen loans" upon securities which some of the banks are supposed to be carrying ought to be adjusted in orderly fashion to the amount of new investment buying.

The New York stock market is commencing to reflect the more cheerful tone that those who keep their ears close to the ground can detect. Stocks are not being bought in boom fashion, but they are passing into the hands of investors at a rate that would have been surprising a few years ago, and good judges of the situation insist that the quantity of stocks that have been withdrawn from the market during the last twelve months is enormous.

There has been a distinct improvement in the tone of the market for the stocks of banks and investment corporations. During the November panic, and for some time thereafter, these two groups were somewhat in disfavor, but close students of the facts are now commencing to regard them favorably and some sharp advances have been seen.

Some of the commodity markets also are firmer, including sugar and rubber. In both cases stocks are just as large as they were when prices made their recent lows, and the recovery is evidence of the truth that after the bearish news is all out it ceases to depress the market. When a commodity sells below its cost of production, supply and demand take it in hand to restore a profitable level. The list of favorable developments could be greatly extended but it is not necessary.

In certain industrial cities there is some unemployment, but the idle workers are gradually finding places into which they will fit, and exhaustive investigation does not indicate that any real distress is likely to be seen.

The reports made by President Hoover's Business Survey Conference Committee continue to be encouraging and the President himself is so well satisfied with the situation that he is arranging to take a short holiday.

Under and back of all the different items which go to make up the fabric of American business there is the Naval Arms Conference in London. Deliberation marks its proceedings, but there is every reason to believe that progress is being made, and if an agreement is reached the economic as well as the political effect will be amazing and cumulative.

Copyrighted
Theodore H. Price Publishing Corporation
95 Broad St., New York

From this page the reader will get a quick picture of current business and industry. The boxed material below is a summary of the letters from regional correspondents of the American Machinist, published in full on the opposite page.

IMPROVEMENT is still the keynote in machinery and machine-tool markets throughout the country, orders being reported in increasing volume from all sections. A large part of the continued flood of inquiries however, is still in the uncertain stage, awaiting affirmative action by plant executives. No group of industries is responsible for the inquiries, and no particular class of machinery is most in demand. All these factors, together with the increasing number of tools in each inquiry and the improvement in business conditions generally, indicate orders in the near future.

NEW YORK dealers are still busy answering inquiries, although railroads are entering the market and some firms report a good week's business. New England anticipates improved business from the automotive industry, with the electrical industry in the lead at the present time. Cincinnati hopes are buoyed up principally by the flood of inquiries, but some substantial orders have been received. Detroit, however, is still a little bit slow.

PHILADELPHIA also is interested principally in the flow of inquiries, with business only slightly less than it was a year ago there. Milwaukee continues in its advances, orders from schools and small shops serving to fill in the time until the big lists begin to come. Buffalo conditions are fair, increased buying being expected within a few weeks. Chicago, meanwhile, is showing steady gain, the used-tool market there, also showing improvement.

THE INDUSTRIAL REVIEW

Weekly progress of the machinery and machine-tool business

THE following reports, gathered from the various machinery and machine-tool centers of the country, indicate the trend of business in these industries and what may be expected from the future:

CINCINNATI

Although there were no important transactions in the past week, there was an appreciable improvement in general market conditions, with less tendency to defer the placing of orders for needed equipment. It seems that the severest phase of the recession is over and that the sales curve is beginning to climb back toward the 1929 level.

Manufacturers report that while there were scattering orders for two or three tools, the week's business was largely made up of sales of single pieces of equipment. The principal buyers were general machinists and miscellaneous users.

A feature of the week was the receipt of several good-sized lists of requirements from railroads, including the C. & N. W. and the C. M & St. P. Miscellaneous inquiries flowed in freely from all sections of the country, the greater portion of these being for single tools and replacements.

Selling agents report that they made at least some gain in sales and had a good volume of inquiries from users in the city and adjacent territory.

MILWAUKEE

Machine-tool manufacturers report steadily increasing order files, with business showing the most noteworthy increases in the territory west of Pittsburgh, and a growing volume of inquiries from all sections. Local dealers report a tendency to delay purchases for a few weeks longer and current purchases for one and two items at a time, with schools and small shops mainly in the market. Nearly all of the larger metal-working plants have been operating on full or nearly full schedules for many weeks, but the small shops have only recently experienced a revival of business. Wisconsin tool, die, and pattern-making shops, together with foundries throughout this region report considerable improvement.

Reductions from the peace-time peak records in Milwaukee metal-trade industries amounted to only ten per cent during December, according to W. J. Fairbairn, secretary of the Milwaukee Metal Trades Association, and he points out that increases have been made during January. Passenger automobile manufacturers are increasing schedules very slowly, but the output of trucks and tractors is almost at maximum in all plants. Completion of the new shops of the C. M. St. P. & P. at West Milwaukee is said to entail the purchase of a number of both metal and woodworking tools beyond those already bought. The rolling stock building and repair program for the Milwaukee road in this city has been increased by $650,000 over the 1929 figures through the addition of the new facilities, not counting work scheduled for the locomotive shops, but largely embracing work on steel coaches.

Extensive purchases of shop equipment for vocational education are planned for schools at Racine, West Allis, South Milwaukee, and for the Michigan School of Mines, at Houghton. Lists are still awaited from local manufacturers of tractors, earth-moving machinery, and cranes.

PHILADELPHIA

An improvement in the machinery and machine-tool business was noted in the Philadelphia market during the last two weeks, as compared to the preceding fortnight, although the period was devoid of any outstanding orders. Most dealers, manufacturers, and sales agents reported their business was slightly less than it was a year ago at this time, although inquiries are coming in in fairly good volume.

The belief that the spring will bring forth considerable activity with prices on a level with their expectations was general throughout the area. Orders from automotive centers were lacking and railroad buying was not noted in the sales of the past two weeks. They were for industrial equipment from a well-scattered area and quite well diversified.

NEW YORK

The United States mail is still the principal beneficiary in the New York machinery and machine-tool market, the flood of inquiries continuing unabated, but few actual orders being signed. One dealer, however, reports the best week's business in the past three months, and another, more business this week than in the entire month of January. G.E. inquiries have not been so much in evidence during the week, but railroads are at last taking a little more interest. The Delaware, Lackawanna & Western has a list of 15 tools out, and the New York Central is inquiring about a pair of radial drills. Inquiries and orders are from a wide variety of fields, prospects usually being larger companies that meant what they said at President Hoover's conferences, and are living up to their statements now. The little fellows are still afraid that the cataclysm of the century is due to break at any moment, in spite of the general improvement in conditions in every section of the country.

Prices show no tendency to change, and deliveries, if anything, are getting poorer in most lines, as a result of orders from other sections of the country. The used tool market is improving steadily, but demand is as it has been for some months —for late-model tools only.

NEW ENGLAND

Although some manufacturers and dealers reported a better sales volume as compared with that of the preceding week, distribution of machine tools has shown little change since December. Orders were for single tools from a fairly representative number of industries, and totaled a seasonal volume.

A feeling is gaining headway in the New England territory that better business will come from the automotive industry sooner than anticipated. More optimistic officials look for substantial bookings from this source not later than early March. While business is still spotty, the outlook is favorable, and a boost in orders from this recent weak sister would eliminate uncertainty.

New England railroad buying relative to machine tools has not materialized to the extent predicted. Inquiry from other railroads, however, has resulted in some orders, and continues promising. Inquiry, generally, is prospective of more business. Buying on the part of the electrical industry is at present the strongest feature of machine-tool trading. Small tools are selling at a satisfactory, if not high, level, and a scattering of good business is being done in conveying, handling, and construction equipment.

DETROIT

Sales of machinery and machine tools are increasing here, but are still irregular and not up to the expectations of the dealers. It was believed that the activity of the motor industry following the national auto show would bring about a substantial improvement of the machinery business, but this has not been true.

In general, conditions seem to be improving, but the automotive industry is still moving at a slow rate. Most of the plants are operating, but they are not producing more than a small percentage of their capacities and are not buying new equipment. Employment figures show a gradual improvement and sales are increasing.

No large orders have been received for machinery or equipment within the past two or three weeks and only a small number of inquiries have been received.

CHICAGO

Machine-tool market conditions as reported by manufacturers' agents and distributors of standard types of shop equipment are steady. The reports on January sales as compared with those of the preceding month indicated an increase, only an occasional recession being noted. Inquiries coming in are said to forecast a better industrial demand in the near future, and with the expected increase in automobile production confidently looked forward to will come an increased demand for such tools and equipment as are indispensable in automotive and auto accessory manufacture. Present demand is scattering, and confined in most cases to replacement necessities. Railroad inquiry continues on a high level, showing a tendency to increase rather than to diminish, with the result that such concerns as specialize in the manufacture of railroad shop tools will be kept busy figuring on bids for some time to come. A better demand for grinding machines and abrasives is reported by manufacturers' agents. Dealers in used tools of standard make and in the best condition are having a satisfactory trade. The first few days of February are reported to indicate a slight upward curve.

BUFFALO

The business doldrums seem to have the machine-tool trade of western New York in their clutches still. There are some faint signs of improvement and salesmen declare that the tone and reactions of buyers are somewhat more favorable than was the case in the middle of January.

A few of the dealers report business inquiries to be somewhat better during the early part of February. Orders for small tools have been good.

Actual sales of tools have in most cases been to small manufacturers. Sales have usually been for single pieces of equipment.

The same conditions hold true of the electrical equipment phase. Inquiries are few in comparison with last year at this time and sales are still fewer. There is a feeling in many quarters that western New York has hit the bottom in the depression and that the upward trend cannot be deferred much longer.

Norton Plans British Plant

A new grinding-wheel manufacturing plant at Welwyn, Garden City, Hertfordshire, England, and a service building at Chicago are included in the building plan of the Norton Co., Worcester, Mass., according to an announcement by Charles L. Allen, president and general manager. The initial plant at Welwyn will include a power house, a 1-story kiln, a 4-story manufacturing building, and a 2-story building for offices, packing, shipping, and similar departments. These buildings will be located on an 11-acre tract 20 miles due north of Kings Cross, London. The new service building at Chicago is located at the corner of 47th Place & Turner Ave., in the Kedzie development. It will be one story in height, 221x121 feet.

* * *

Ryerson Completes Detroit Expansion

A heated building with increased facilities for storing and dispatching has been completed by Joseph T. Ryerson & Son, Chicago, at 1,600 Euclid Ave., Detroit. The unit is 120x300 ft., including five bays and a transfer bay at one end with facilities for outside loading of freight cars. Five cranes move material from all parts of the building to the transfer bay. An open span, 90x350 ft., has been developed between the new unit and the old buildings, for storage space.

* * *

PUBLICATION by the U. S. Bureau of Internal Revenue of a manual of depreciation rates on industrial machinery has been deferred indefinitely. Returns filed on 1929 income will be unaffected, therefore, by the new rates.

Business Items

The Roller-Smith Co., 233 Broadway, New York City, has made several sales organization changes. M. W. Seymour, formerly of the company works in Bethlehem, Pa., has been transferred to the New York office as a sales engineer. H. D. Stier, 101 Marietta St., Atlanta, Ga., now represents the Roller-Smith Co. in the states of Alabama, Florida, Georgia, North Carolina, and South Carolina. The H. N. Miller Co., First National Bank Bldg., Pittsburgh, Pa., represents the company in western Pennsylvania, West Virginia, and the Youngstown district of Ohio. Associated there are H. E. Ransford and F. E. Harper.

The Nicetown Manufacturing Co., Inc., has been created in Philadelphia to take over the operations of the Philadelphia Lawn Mower Co., Inc., Davis Brothers, Inc., and Paul & Beekman Manufacturing Co., all of Philadelphia. The three latter companies will function as sales agencies for the Nicetown Company and the sales personnel will remain intact. Management and policies will remain unchanged. All the plants of the companies will be located at 4250 Wissahickon Ave., Philadelphia. Officers of the company, who are also officers of the constituent companies, are: Edward L. Davis, president; H. M. Hessenbruch, vice-president in charge of operations; W. A. B. Paul, vice-president in charge of sales; S. H. Paul, vice-president in charge of engineering, and W. B. Whitney, secretary and treasurer.

The Atlantic district sales and service departments of the General Electric Co. at Philadelphia have been moved from the Witherspoon Bldg., which they had occupied for 22 years. The sales and engineering departments now occupy the 17th, 18th and 19th floors of the Mitten Bldg., Broad & Locust Sts. The service departments, together with the warehousing units and the service shop, are now located in the General Electric Bldg., at 429 North 7th Street.

The New Idea Spreader Co., Coldwater, Ohio, has acquired the Sandwich (Ill.) Manufacturing Co., and will continue operations at the plant with E. C. Mosher, vice-president, and A. E. Woodward, secretary, in charge of the plant. C. C. Jones, president, for 52 years associated with the Sandwich concern, is retiring from active industrial life. The New Idea company paid cash for the controlling stock, the reported price being $550,000, plus accrued dividends.

Articles of incorporation have been filed with the secretary of state in Indianapolis by the Thomas Manufacturing Co., Inc., with a principal place of business in Newcastle, Ind. The corporation will manufacture castings, forgings, fireproof doors, and builders' hardware. The incorporators are Robert M. Thomas, R. C. Thomas, and H. S. Capron.

The Rahn Larmon Co., Cincinnati, Ohio, at a special stockholders' meeting, elected these directors: B. J. Larmon, Ferd T. Nebel, Oliver M. Dock, George S. Lott, and Horace Todd. The new board immediately elected these officers: Ferd T. Nebel, president and treasurer; B. J. Larmon, vice-president; and Oliver M. Dock, secretary.

The Plantsville (Conn.) Foundry Corporation has incorporated to operate a foundry in the plant formerly occupied by the Walker-Stewart Foundry Corporation. The company is capitalized for $50,000 and has the following officers: president, Thomas Thomson; vice-president, Charles C. Persianna; treasurer, Thomas J. Aubrey; secretary, Victor Walker.

At a recent directors' meeting of the Haynes Stellite Co., New York, a unit of the Union Carbide & Carbon Corporation, E. E. LeVan was appointed general sales manager and J. H. Maguire was appointed works manager. Other appointments were: F. T. McCurdy, plant superintendent; J. R. Brown, F. L. Secord, and Everett Page, assistants to superintendent; L. H. Brown, research engineer.

Incorporation of the Defiance Packless Valve & Manufacturing Company, Quincy, Ill., completed last week is a preliminary step in reorganization. The company has capital stock of $50,000. L. J. Kadeski, inventor of the valve, is president, and Joseph T. Fisher, Will Colvin, J. R. Erman and George Wendt, all of Springfield, and Mrs. D. M. Kadeski, are other incorporators.

The Ammex Equipment Co., 406 San Francisco St., El Paso, Tex., has been appointed by Foote Bros. Gear & Machine Co., Chicago, Ill., as district representative in the Texas territory lying west of a line drawn from Farwell to Sweetwater and then south to Spofford, and also for all of New Mexico and all the states of Mexico, except Nuevo Leon and Tamaulipas.

Plans for the addition and extension to the fabricating plant of the Beaird Corporation, Shreveport, La., have been completed and construction is ready to be started. Plans were prepared by company engineers and will be under company supervision. Total cost of extensions and additional machinery is estimated at $250,000, according to James R. Beaird.

Officials of the Chamber of Commerce at Goshen, Ind., have announced that Combustioneer, Inc., manufacturer of automatic stokers, will move from Cicero, Ill., to Goshen. The company will be in operation in April at the old plant of the Engman Range Co. Ray C. Goddard of Omaha, Neb., is president.

The O. K. Tool Co., Inc., Shelton, Conn., has awarded The Austin Co. a contract for the design and building of two structures for manufacturing, heat treating, and storage. One of the buildings, the largest, will be 40x182 ft., a part of it being four stories high. The cost is $50,000.

The Excel Auto Radiator Co. is establishing a plant at Oakland, Calif., and will employ between 40 and 60 workers. Its principal offices and plants are located in Chicago, Philadelphia, and New York City. The Oakland plant will represent an investment of approximately $100,000, according to officials.

The Kinite Corporation, Milwaukee, has increased its facilities by the addition of the Toledo foundry of the Owens-Illinois Glass Co. The foundry, in addition to handling Kinite needs in the territory, will make grey-iron castings for the three Owens-Illinois plants in West Virginia.

The Ames Shovel & Tool Co. has transferred business and operations of the St. Louis (Mo.) factory to the Anderson (Ind.) plant, it was announced by E. T. Nipher, manager at Anderson. The Beaver Falls (Pa.) and Elwood (Ind.) units of the corporation were moved to Anderson about

a year ago. Two buildings have been erected at the plant in Anderson and all western operations now are centered in that city.

The Reliance Electric & Engineering Co., 1042-1090 Ivanhoe Road, Cleveland, has established an office at 207 Richardson Bldg., Toledo, Ohio, to serve northwestern Ohio and Indiana, and Southern Michigan. C. E. Stine, formerly of the Detroit office, will be in charge.

The Billings & Spencer Co., Hartford, Conn., has opened a New York office and warehouse in charge of W. Roy Moore, Metropolitan sales manager. A complete stock will be carried there. The Husky Corporation line will also be stocked.

The Gestetner Duplicator Co., an independent American organization to produce machines developed in England, has established its first factory in a unit of the former International Fuse & Arms Co. works at Bloomfield Ave. & Grove St., Bloomfield, New Jersey.

The Foote Bros. Gear & Machine Co., Chicago, Ill., has recently appointed Max E. Landry, 202 Local Bldg., Oklahoma City, Okla., representative in the northern half of Oklahoma, for IXL gears and speed reducers.

The Pittsburgh Forgings Co. will acquire all common stock of the Greenville (Pa.) Steel Car Co., according to actions announced recently by Edwin Hodge, president of the former company.

The Vickers Manufacturing Co., Los Angeles, Calif., has transferred its plant and office to 7752 Du Bois St., Detroit, Mich., where the company will operate under the name of Vickers, Incorporated.

The Baltimore plant of the Bentz Engineering Corporation, Newark, N. J., has been purchased by the Maryland Air Conditioning Corporation, Baltimore, a recently organized company.

Stocks of standard parts have been located at strategic points throughout the country by the Link-Belt Co., Indianapolis, Ind., to give overnight service on orders.

The Magnetic Manufacturing Co., Milwaukee, is constructing a new research laboratory.

The Trundle Engineering Co., Cleveland, has added 3,200 sq.ft. of floor space to the plant of the company in that city.

Personals

HARRY L. BARKER, president and general manager of the Meadows Manufacturing Co., Bloomington, Ill., has resigned his position, and HAL M. STONE was elected to succeed him as president. SAMUEL SIDDALL, general manager was made vice-president. Mr. Barker has headed the company the past seven years. He retains his position as a director. Officers for the year have been elected as follows: Mr. Stone, president and general counsel; Mr. Siddall, vice-president and general manager; E. S. Ridgeway, vice-president in charge of sales; William Rocke, treasurer; Franklin Whitehead, secretary; Messrs. Barker, Rocke, Stone, Siddall, Ridgeway, Whitehead, and John Rocke, H. K. Dick, LeRoy A. King, Gipson P. Gilmer, J. H. VanCleve, Julius V. Weiss and A. A. Breuer, directors.

W. EARLE PASHLEY, advertising manager of the C. F. Pease Co., 813 North Franklin St., Chicago, Ill., has been appointed assistant sales manager and second vice-president. Simultaneously with that appointment, Mr. Pashley was elected to the board of directors.

CARL M. KALTWASSER has resigned as vice-president and general manager of the Salisbury Axle Co., Jamestown, N. Y., and Toledo, Ohio, and from an executive capacity with the Brown-Lipe Gear Co., Syracuse, N. Y., to become identified with the Timken-Detroit Axle Co., as assistant to FRED GLOVER, president and general manager, with headquarters in Detroit. He has been succeeded by FREDERICK P. HALL, JR., formerly executive engineer of the Spicer Manufacturing Company.

CARL L. WALMSLEY has been elected president of the Leader Iron Works, Inc., Decatur, Ill., succeeding T. E. O'BRIEN, who served as head of the corporation for the past 13 years. Mr. O'Brien resigned Jan. 1 to devote himself to the newly formed Leader Boiler & Heating Co. Other officers were re-elected. W. P. Stauber, William Canavan, and L. W. Snerly are vice-presidents; A. G. O'Neill, secretary-treasurer; L. A. Moran, J. D. Johnson, and Walmsley, O'Brien, Snerly, Canavan, and Stauber, directors.

GEORGE W. DUNHAM, until recently vice-president of the Whirldry Corporation, New Haven, Conn., has opened a consulting engineering office at 535 Fifth Ave., New York. Mr. Dunham, at one time president of the S.A.E., and chief engineer of the Chalmers Motor Car Co., who for many years prominent in automotive work. For the past seven years he has been identified with the development and production of several electrical appliances, especially for domestic use, including the Savage and Whirldry washers and ironing machines.

F. G. KALL, for the past 15 years New England representative of the Clipper & Detroit Belt Lacer companies, and F. S. ROBINSON, who has represented the Hawley Hardware Co. for the past ten years, have formed the Kall-Robinson Co., 19 Union Square, Bridgeport, Conn., to deal in mill, factory, and contractor's supplies in that vicinity. FRED BOERUM, connected with the Hawley Hardware Co., for the past 23 years, will be associated with them.

L. J. DICIANNE has been transferred from the position of branch manager of the Minneapolis office of the Wagner Electric Corporation, 6400 Plymouth Ave., St. Louis, Mo., to the branch managership of the Kansas City office. He is a graduate of Cornell University, and joined the Wagner Electric Corporation immediately upon graduation. MAJ. E. R. ELAM has been appointed branch manager of the Minneapolis territory to succeed Mr. Dicianne. Major Elam joined the Wagner Corporation in 1927 as a salesman in the St. Louis territory.

W. B. MARSHALL, of the Chain Belt Co., Milwaukee, presented a paper on "Material Handling in Small Foundries" at the sectional meeting of the Ohio Foundries Association, at Dayton, Ohio, on Feb. 6. A. A. GRUBB, metallurgical engineer, Columbus, Ohio, presented a paper on "Advances in Nonferrous Foundry Practice," and A. H. KRAMER, president of the Advance Foundry Co., Dayton, Ohio, presented a paper on "The Ohio Foundry Code."

ARTHUR J. HERSCHMANN, for some years in charge of the mechanical department of the George A. Fuller Co. and the United States Realty Corporation, New York, and lately a representative in the United States for a foreign maker of steel forgings and castings, has been made agent for the Witkowitz Steel Works of Czechoslovakia, to specialize in forgings and castings, with headquarters at 50 Church St., New York.

BENJAMIN O'SHEA, formerly president of the Union Carbide Co., and the Electro-Metallurgical Co., both units of the Union Carbide & Carbon Corporation, New York, was elected chairman of the board of each company at a recent meeting. FRED H. HAGGERSON, former vice-president, was elected president, and F. P. GORMELY was elected vice-president and general manager of both units.

R. E. HELLMUND, East Pittsburgh, Pa., has been awarded the Lamme Medal of the A.I.E.E. "for his contributions to the design and development of rotating electrical machinery." It is expected that the medal will be presented at the summer convention of the Institute, to be held in Toronto, Canada, June 23-27, 1930. Mr. Hellmund is chief electrical engineer of the Westinghouse Electric & Manufacturing Company.

MAJ. GARDNER S. WILLIAMS, Ann Arbor, Mich., has been named acting president of the American Engineering Council, New York. He will occupy the office until the return from a trip around the world of Carl E. Grunsky of San Francisco, former head of the A.S.C.E., who has been elected president for a two-year term, succeeding ARTHUR W. BERRESFORD of New York.

COLIN L. CAMPBELL, Cadillac Machinery Co., Detroit, sailed for Europe on Friday, Feb. 7, accompanied by his father and by D. B. BURLEIGH, sales manager, Sundstrand Machine Tool Co., Rockford, Illinois.

W. H. WOOD, head of the American Car & Foundry Co., New York, has been made president of the American

Car Manufacturers Institute, 61 Broadway, New York. He succeeds the late J. M. Hanssen. J. T. MacEnulty, vice-president of the Pressed Steel Car Co., was elected first vice-president, and C. A. Liddle, president of Pullman Car & Manufacturing Corporation, second vice-president. W. C. Tabbert was elected secretary and treasurer, succeeding William Bierman, treasurer. Mr. Bierman is secretary of the Standard Steel Car Co. and had been treasurer of the *Institute* since its founding.

E. J. Vonderheide, engineer for the Cincinnati Milling Machine Co., gave a talk on the present trend toward noise elimination before the Cincinnati chapter of the A.S.S.T. on Feb. 6. He explained that steps toward the elimination of operating noises taken by the automobile manufacturers have educated the public to expect quietness of operation in all mechanical units.

Alexander Warden, New York, has been elected treasurer of the Cheney Bigelow Wire Works, Springfield, Mass., to succeed W. Bruce Birnie, who drops his official position as treasurer but continues as president. Mr. Warden was associated with the Van Sweringen railroad interests and was aso connected with the National City Bank of New York.

Edward N. Hurley, Chicago, wartime chairman of the U. S. Shipping Board, was elected president of the American Manufacturers' Export Association recently at a meeting of the board of directors. Mr. Hurley succeeds Thomas J. Watson, president of the International Business Machines Corporation, who presided at the meeting.

A. H. d'Arcambal, consulting metallurgist of the Pratt & Whitney Co., Hartford, delivered a paper summarizing the causes of machine-tool failures and the problems encountered in hardening metal-cutting tools before the Cleveland chapter of the A.S.S.T. on Feb. 10. He used both specimens and lantern slides for illustration.

A. E. Bergland, president of the Jones Road Machinery Co., Galva, Ill., and other officers and directors were re-elected at the annual meeting last week. Other officers are: J. M. Alford, vice-president; B. W. Johnson, secretary; W. E. Jones, sales manager; and R. A. Soderberg, treasurer.

Ralph S. Thatcher of the Thomas Machinery Co., Los Angeles, Calif., has been at the factory of the Electric Machinery Manufacturing Co., Minneapolis, for the past six months for special training. On his return he will specialize on synchronous motor applications, working with W. C. King.

J. G. Benedict, general manager of the Landis Machine Co., Waynesboro, Pa., and C. N. Kirkpatrick, general sales manager, sailed for Europe on Jan. 31. They expect to spend two months in England and on the Continent securing first-hand information of European conditions.

A. C. Morse, president and general manager of the Ohio Seamless Tube Co., Shelby, Ohio, resigned on Jan. 31 to become chairman of the board of directors. Judge Edward Mandfield succeeded him as president and Frank Benham as general manager. Other officers were re-elected.

Charles J. Miller was re-elected president of the Fremont Foundry Co., Fremont, Ohio, at a meeting of the board of directors recently. J. L. Dryden, Detroit, was elected vice-president. A. J. Kroenke, Cleveland, treasurer, and L. M. Allen, Detroit, secretary.

William B. Prosser has been appointed general manager of the Perfect Circle Co., Tipton, Ind., following the transfer of William Kramer to the Hagerstown, (Ind.) plant. Thomas Bolton is factory superintendent and J. E. Prifogle is his assistant.

W. H. Foster has resigned as sales manager and director of the Foster Stove Co., Ironton, Ohio, and has retired from active connection with the business. E. C. McKibben, formerly of Rock Island, Ill., has been appointed to succeed Mr. Foster.

E. C. Waldvogel, vice-president in charge of sales of the Yale & Towne Manufacturing Co., Stamford, Conn., will retire from active participation in

the company's affairs on April 1. He has been connected with the company for the past 25 years, and will remain as a director and in an advisory capacity.

Jack W. Duelks, formerly sales manager for the American Aircraft Corporation, has accepted the appointment as sales manager for the Earl Aircraft Corporation, Ltd., Los Angeles, California.

John Motley Morehead, electrical engineer with the Union Carbide & Carbon Co., New York City, and also mayor of Rye, N. Y., has been appointed Minister to Sweden by President Hoover.

George L. Dumbauld, assistant treasurer of the Blaw-Knox Co., Pittsburgh, has been elected treasurer, succeeding Benjamin L. Hirshfield, who resigned to succeed Maurice Falk as chairman of the finance committee.

Charles M. Day, manager of the St. Louis office of Hickman, Williams & Co., Chicago, for several years, was elected vice-president at the recent annual meeting.

J. M. McComb of the Crucible Steel Co., New York, has been elected president of the Motor & Equipment Association.

A. F. Yeaton, chief engineer of the Star Drilling Machine Co., Akron, Ohio, has resigned to become sales manager of the International Derrick & Equipment Co., Columbus, Ohio.

Herbert A. May, vice-president of the Union Drawn Steel Co., Beaver Falls, Pa., has been elected a director of the Pittsburgh Steel Foundry Corporation.

Frederick Alan Schaff has been elected president of the Superheater Co., New York, and George L. Bourne, retiring president, has been made chairman of the board.

Arthur C. Pletz has resigned as assistant sales manager of the Pratt & Whitney Co., Hartford, Conn., to become associated with the production department of Aluminum Industries, Inc., Cincinnati.

William J. Brant, secretary-treasurer of the Pittsburgh Foundrymens' Association, has been elected a director of the Industrial Silica Corporation, Youngstown, Ohio.

Donald S. Johnson, St. Louis, formerly sales representative of the Commonwealth Steel Co., Granite City, Ill., has become connected with Folds, Buck & Co., in their St. Louis office.

Daniel A. Daly, associated for many years with Standard Steel Sections, Inc., New York, has resigned to become head of the Steel Trade Credit Association of that city.

E. J. Shaw, for the past six years general superintendent of the Star Drilling Machine Co., Akron, Ohio, has resigned to accept a position with the Babcock & Wilcox Co., at Barberton, Ohio.

Martin Brockman is superintendent of the foundry department of the Cincinnati Milling Machine Co., Oakley, Ohio, which recently set a record of one month without an accident.

Elias Mayer, president of the General American Tank Car Corporation, New York, has been elected a director of the Atlas Stores Corporation, Chicago.

George W. Mason, former president of the Copeland Products Co., Detroit, has been elected president of the Kelvinator Corporation of that city.

W. J. Zink has been appointed Alabama representative of the Reading Chain & Block Corporation, Reading, Pennsylvania.

K. E. Walter was elected president, C. S. Randolph vice-president, and J. A. Saylor secretary-treasurer of the

Alliance Forging Co., at the stockholder's meeting on Jan. 21.

JAMES C. MORGAN will take complete charge of all materials-handling equipment sales for the Yale & Towne Manufacturing Co., Stamford, Conn., on April 1, when E. C. Waldvogel retires.

Mr. Morgan has been with the company for the last ten years, joining them from the C. W. Hunt Company.

P. L. THOMPSON, an executive of the Western Electric Co., New York, has been re-elected president of the Audit Bureau of Circulations.

Obituaries

FRANCIS COLE PRATT, former vice-president and chairman of the manufacturing committee of the General Electric Co., died Jan. 26 in New York City after an illness of six weeks. Born in 1867, at Hartford, Conn., he was graduated from the Sheffield Scientific School of Yale University with the degree of Ph.B. in mechanical engineering in 1888. After graduation he was associated with the Pratt & Whitney Co., of which his father was president and one of the founders, continuing with them until he became vice-president. Mr. Pratt joined the General Electric Co. in 1906 as assistant to E. W. Rice, in charge of manufacturing and engineering. He was made assistant to the president in 1913 and was elected vice-president in 1919. As vice-president he at first had charge of engineering and later of both engineering and manufacturing. He retired in 1927.

W. H. ALFORD, vice-president and controller of the Nash Motors Co., Kenosha, Wis., died there on Feb. 5 of heart disease. He was 52 years of age.

ROBERT C. ZANNOTH, president and general manager of the Roberts Brass Co., which he founded in 1914, died at the age of 63 years on Jan. 25, after a brief illness.

JOHN OLLE, 59, president of the Racine (Wis.) Brass & Iron Works, died on Jan. 28. He established the foundry in association with John Tooman in 1900.

GEORGE E. HOWARD, 46, retired eastern representative of the Flannery Bolt Co., Pittsburgh, died at his home in Short Hills, N. J., on Feb. 2.

ARTHUR B. CALDWELL, 71, vice-president and treasurer of the Van Camp Hardware & Iron Co., Indianapolis, died recently at his home. He entered the service of the Van Camp company when 19 years old, working continuously for the same organization 52 years.

WILLIAM J. MCCONNELL, dean of the executives of the Singer Manufacturing Co., died on Feb. 3 after a short illness. He was employed by the Singer Co. for 59 years, entering the employ of the company in the polishing and plating department in 1871.

COL. WILLIAM H. H. HUTTON, JR., pioneer automobile manufacturer and one of the organizers of the Timken-Detroit Axle Co., Detroit, who retired from active business in 1926, died on Jan. 30 at his home in Wilmington, Del. He was 60 years of age.

REGINALD H. BULLEY, 76, former chief engineer of the Halcomb Steel Works division of the Crucible Steel Co. of America, with headquarters in Syracuse, N. Y., died Jan. 27 at his winter home in Cocoanut Grove, Fla. Up to his retirement six years ago, he had been with the company for 20 years.

FRED F. BIXBY, manager of the materials department of the American Car & Foundry Co., New York, was asphixiated in his garage in St. Louis two weeks ago. He was 65 years of age and a native of Adrian, Michigan.

FRED A. WYGANT, 63, founder of the Wymarsh Foundry Co., Hornell, N. Y., died recently at his home in Cream Ridge, N. J., where he had resided since his retirement four years ago.

FRANK H. GUPPY, 50, secretary of the Superior Steel Products Co., Monaca, Pa., and formerly secretary of the Moltrup Steel Products Co., Beaver Falls, Pa., died on Jan. 30.

P. L. SOWERSBY, 47, Cleveland manager of the Crane Co., Chicago, died of pneumonia at his home in Cleveland on Jan. 29, after an illness of two weeks.

MRS. ELIZABETH DREVER, 68, president for the last five years of the Tomahawk Steel & Iron Works, Tomahawk, Wis., died at Muskegon, Mich., on Jan. 28.

FRANK J. BRITTINGHAM, 46, Pittsburgh district manager of the Cleveland Crane & Engineering Co., died on Jan. 27 at Pittsburgh.

BYRON E. VEATCH, vice-president of the Bell Lock Co., Chicago, and active with that company for many years, died recently.

CHARLES G. WADE, 69, consulting engineer, who was at one time connected with the Allis-Chalmers Manufacturing Co., and the Falk Corporation, Milwaukee, died recently at his home in that city.

Forthcoming Meetings

ENGINEERING INSTITUTE OF CANADA —Annual meeting Feb. 12-14. R. J. Durley, 2050 Mansfield St., Montreal, Que., is secretary.

AMERICAN INSTITUTE OF MINING & METALLURGICAL ENGINEERS — Annual meeting, Feb. 17-20, New York City. H. Foster Bain, 29 West 39th St., N. Y., is secretary.

SOCIETY OF AUTOMOTIVE ENGINEERS —National Aeronautic Meeting, Hotel Jefferson, St. Louis, Mo., Feb. 18-20, in conjunction with the Aeronautical Chamber of Commerce, as a part of the International Aircraft Exposition. Society headquarters are at 29 West 39th St., New York.

NATIONAL MANAGEMENT CONGRESS —Stevens Hotel, Chicago, March 3 to 5. National Industrial Equipment Exposition in connection, March 3 to 7. G. E. Pfisterer, 308 W. Washington St., Chicago, is manager.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS — National Materials Handling meeting, March 5-7, Stevens Hotel, Chicago. Calvin W. Rice, 29 W. 39th St., New York City, is secretary.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—Fiftieth Anniversary Celebration, Opens in New York, April 5, afternoon in Hoboken; April 6 in New York; April 7, 8, and 9 in Washington, D. C. Calvin W. Rice, 29 W. 39th St., New York, is secretary.

AMERICAN FOUNDRYMEN'S ASSOCIATION — Annual Convention, Cleveland Public Auditorium, Cleveland, Ohio, May 12-17. C. E. Hoyt, 222 W. Adams St., Chicago, is secretary-treasurer.

SOCIETY OF AUTOMOTIVE ENGINEERS —1930 Summer Meeting, French Lick Springs Hotel, French Lick Springs, Ind., May 25-29. National headquarters are at the Engineering Societies Bldg., 29 W. 39th St., New York City.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS — Semi-annual meeting, Hotel Book-Cadillac, Detroit, June 2 to 12. Calvin W. Rice, 29 West 39th St., New York City, is secretary.

STEEL INDUSTRY'S EXECUTIVES—Annual Iron & Steel Exposition. Under the sponsorship of the Iron & Steel Electrical Engineers, June 16-20, Broadway Auditorium, Buffalo, N. Y. John F. Kelly, 1010 Empire Bldg., Pittsburgh, Pa., is managing director.

AMERICAN SOCIETY FOR TESTING Hall, Atlantic City, N. J. June 23-27. C. L. Warwick, 1315 Spruce Street, MATERIALS—Annual meeting, Haddon Philadelphia, is secretary-treasurer.

THE WEEKLY PRICE GUIDE . . .

Rise and Fall of the Market

STEEL prices (except black sheets) remain steady after the recent downward movement. The minimum on black sheets is down 10c. per 100 lb., to $2.55, base, Pittsburgh, compared with prices of a week ago. Buying of railway steel has again developed marked activity after a short spell of dullness. In the non-ferrous metals, a downward turn in tin and zinc is offset by higher quotations for solder and babbitt in current transactions. Copper in small lots at warehouse remains firm.

(All prices as of Feb. 7, 1930)

IRON AND STEEL

PIG IRON—Per gross ton, f.o.b:

CINCINNATI	
No. 2 Southern (silicon 1.75@2.25)	$17.69@$18.19
Northern Basic	19.90
Southern Ohio No. 2	19.90
NEW YORK—Tidewater Delivery	
No. 2 Southern (silicon 1.75@2.25)	19.50
BIRMINGHAM	
No. 2 Foundry (silicon 1.75@2.25)	15.00
PHILADELPHIA	
Eastern Pa., No. 2x (silicon 2.25@2.75)	21.76@22.26
Virginia No. 2	24.04
Basic	19.75@20.25
CHICAGO	
No. 2 Foundry, local (silicon 1.75@2.25)	20.00
No. 2 Foundry, Southern (silicon 1.75@2.25)	20.01
PITTSBURGH, including freight charge ($1.76) from Valley:	
No. 2 Foundry	20.26
Basic	20.26
Bessemer	20.76

IRON MACHINERY CASTINGS—Cost in cents per lb. of 100 flywheels, 6-in. face x 24-in. dia., hub not cored, good quality gray iron, weight 275 lb:

Detroit	4.50
Cleveland	5.00
Cincinnati	4.50
New York	5.25
Chicago	4.50@4.75

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the mill base in large lots:

Blue Annealed*	Pittsburgh Mill Base	Chicago	Cleveland	New York
No. 10	2.10@2.20	3.35	3.30	3.90†
No. 12	2.15@2.25	3.45	3.35	3.95†
No. 14	2.25@2.35	3.55	3.45	4.00†
No. 16	2.35@2.45	3.65	3.55	4.10†
Black				
Nos. 18 to 20	2.35@2.55	3.85	3.55	3.70
No. 22	2.50@2.70	4.00	3.70	3.85
No. 24	2.55@2.75	4.05	3.75	3.90
No. 26	2.65@2.85	4.15	3.85	4.00
No. 28	2.80@3.00	4.75	4.00	4.15
Galvanized				
No. 10	2.60@2.70	4.20	3.80	3.80
Nos. 12 to 14	2.70@2.80	4.30	3.90	3.90
No. 16	2.80@2.90	4.40	4.00	4.00
No. 18	2.95@3.05	4.55	4.15	4.15
No. 20	3.10@3.20	4.70	4.30	4.30
No. 22	3.15@3.25	4.75	4.35	4.35
No. 24	3.30@3.40	4.90	4.50	4.50
No. 26	3.55@3.65	5.15	4.75	4.75
No. 28	3.80@3.90	5.40	5.00	5.00

*Light plates. †Up to 3,999 lb.

WELDED STEEL PIPE—Warehouse discounts are as follows:

	New York		Cleveland		Chicago	
	Black	Galv.	Black	Galv.	Black	Galv.
1 to 3 in. butt	53.74%	41.2%	55.5%	43.5%	55.5%	42.5%
3½ to 6 in. lap	50.32%	37.78%	53.5%	40.5%	51.6%	39.0%

WROUGHT-STEEL PIPE LIST

Size, Inches	List Price per Foot	Diameter in Inches—External	Diameter in Inches—Internal	Thickness Inches
⅛	$0.17	1.315	1.049	.133
¼	.23	1.66	1.38	.14
⅜	.27½	1.9	1.61	.145
½	.37	2.375	2.067	.154
⅝	.58½	2.875	2.469	.203
¾	.76½	3.5	3.068	.216
⅞	.92	4.0	3.548	.226
1	1.09	4.5	4.026	.237
1¼	1.48	5.563	5.047	.258
1½	1.92	6.625	6.065	.28
2	2.50	8.625	8.071	.277

SEAMLESS STEEL TUBING—Following net prices are for seamless mechanical tubing, cold drawn, round, .10 to .30 carbon, at New York warehouse in lots of less than 100 ft. or 100 lb:

Thickness—Decimal Fractions	B.w.g. and	Outside Diameter in Inches—Price per Foot— ⅛	¼	⅜	½	⅝	¾	1	1¼	1½
.035″	20	$0.15	$0.16	$0.17	$0.18	$0.19	$0.21	$0.23		
.049″	18	.17	.18	.19	.20	.21	.23	.25		
.065″	16	.19	.20	.21	.22	.23	.25	.27		
.083″	14	.20	.22	.23	.24	.25	.27	.29		
.095″	13	.21	.23	.25	.26	.27	.29	.31		
.109″	12	.22	.24	.26	.27	.28	.30	.32		
.120″ or .125″	11	.23	.25	.27	.28	.29	.31	.33		
.134″	10	.24	.26	.28	.29	.30	.32	.34		

MISCELLANEOUS—Warehouse base prices in cents per lb:

	New York	Cleveland	Chicago
Spring steel, light*	4.50	4.65	4.65
Spring steel, heavier	4.00	4.00	4.00
Coppered Bessemer rods	6.05	6.00	6.20
Hoop steel	4.25†	4.00	4.15
Cold rolled strip steel	6.25	6.00	6.10
Floor plates	5.10†	5.30	5.00
Cold drawn, round or hexagon‡	3.50	3.65	3.60
Cold drawn, flat or square‡	4.00	4.15	4.10
Structural shapes	3.30†	3.00	3.10
Soft steel bars	3.25†	3.00	3.00
Soft steel bar shapes	3.25†	3.00	3.00
Soft steel bands	3.75†	3.65	3.65
Tank plates	3.30†	3.00	3.10
Bar iron (2.75 at mill)	3.25	3.00	3.00
Drill rod (from list)	60%	55%	50%

*Flat, $\frac{3}{16}$-in. thick. †Up to 3,999 lb., ordered and released for shipment at one time. ‡Cold finished steel, shafting and screw stock.

Electric welding wire at New York warehouse— $\frac{3}{32}$, 8.35c. per lb.; $\frac{1}{8}$, 7.85c. per lb.; $\frac{5}{32}$ to $\frac{1}{2}$, 7.35c. per lb.

METALS

Warehouse Prices in Cents Per Pound for Small Lots:

Copper, electrolytic, New York			19.25
Tin, Straits, pigs, New York			40.00@41.00
Lead, pigs, E. St. Louis	6.10	New York	7.00@7.50
Zinc, slabs, E. St. Louis	5.25	New York	6.50@7.50

	New York	Cleveland	Chicago
Antimony, slabs	10.50@11.00	11.50	14.50
Copper sheets, base	27.75	27.75	27.75
Copper wire, base	20.12½	20.12½	20.12½
Copper, drawn, round, base	26.25	26.25	26.25
Copper tubing, base	29.25	29.25	29.25
Brass sheets, high, base	23.25	23.25	23.25
Brass tubing, high, base	28.25	28.25	28.25
Brass rods, high, base	21.25	21.25	21.25
Brass wire, high, base	23.75	23.75	23.75

SHOP MATERIALS AND SUPPLIES

METALS—Continued

	New York	Cleveland	Chicago
Aluminum ingots, 99%.....	25@26	24.30	24.30
Zinc sheets (casks).....	10.75@11.25	12.25	10.11
Solder (½ and ½).....	29.75	29.75	28@30
Babbitt metal, delivered in case lots, New York, cents per lb:			
Genuine, highest grade.....			58.00
Commercial genuine, intermediate grade.....			42.00
Anti-friction metal, general service.....			31.00
No. 4 babbitt, f.o.b.....			11.50

NICKEL AND MONEL METAL—Price in cents per lb., base, f.o.b. Huntington, W. Va:

	Nickel	Monel Metal
Sheets, full finished.....	52.00	42.00
Sheets, cold rolled.....	60.00	50.00
Strip, cold rolled.....	55.00	45.00
Rods, hot rolled.....	45.00	35.00
Rods, cold drawn.....	53.00	40.00
Tubing	75.00*	90.00†
Angles, hot rolled.....	50.00	40.00
Plates.....	52.00	42.00

*Seamless. †Welded.

OLD METALS—Dealers' purchasing prices in cents per pound, f.o.b. cars:

	New York	Cleveland	Chicago
Crucible copper.....	14.50 @15.00	13.50	13.00 @13.50
Copper, heavy, and wire..	13.50 @14.00	13.00	12.25 @12.75
Copper, light, and bottoms	12.00 @12.25	12.00	11.25 @11.75
Heavy lead.....	4.50 @ 5.00	5.25	4.25 @ 4.75
Tea lead.....	2.87½@ 3.12½	3.25	3.25 @ 3.75
Brass, heavy, yellow.....	7.75 @ 8.00	8.00	7.25 @ 7.75
Brass, heavy, red.....	11.25 @11.75	12.50	10.25 @10.75
Brass, light.....	6.25 @ 6.75	7.00	6.25 @ 6.75
No. 1 rod-brass turnings.	9.00 @ 9.25	8.00	7.75 @ 8.25
Zinc.....	2.50 @ 2.75	3.00	2.00 @ 2.50

TIN PLATES—Charcoal—Bright—Per box:

	New York	Cleveland	Chicago
"AAA" Grade:			
IC, 14x20.....	$12.10	$11.95	$11.50
"A" Grade:			
IC, 14x20.....	9.70	9.90	9.50
Coke Plates—Primes—Per box:			
100-lb., 14x20.....	6.45	6.10	7.00
Terne Plates—8-lb. Coating—Small lots—Per box:			
IC, 14x20.....	7.75@8.00	7.00	7.50

MISCELLANEOUS

	New York	Cleveland	Chicago
Cotton waste, white, per lb..	$0.13*	$0.16	$0.15
Cotton waste, colored, per lb..	.09½*	.12	.12
Wiping cloths, washed, white, per lb.....	.12½	38.00 per M	.16
Sal soda, per lb.....	.02½	.02	.02
Roll sulphur, per lb.....	.028	.03½	.04
Linseed oil, raw, in 1 to 4 bbl. lots, per lb.....	.148	.164	159
Cutting oil, about 25% lard, in 5 gal. cans, per gal.....	.65	.60	.65
Machine oil, medium-bodied (55 gal. steel bbl.) per gal..	.33	.36	.24
Belting — Present discounts from list in fair quantities (½ doz. rolls) for leather or rubber:			
Leather—List price, 24c. per lin. ft., per inch of width, for single ply:			
Medium grade.....	30–10%	30–10%	35%
Med. grade, heavy wgt..	30%	30– 5%	30%
Rubber transmission, 6-in., 6 ply, $1.83 per lin.ft:			
First grade.....	50%	50–10%	50%
Second grade.....	60%	60– 5%	50–10%

*Grade F.

Comparative Warehouse Prices

New York	Unit	Current Price	Four Weeks Ago	One Year Ago
Soft steel bars.....	per lb..	$0.0325	$0.0325	$0.0325
Cold drawn shafting...	per lb..	.035	.035	.035
Brass rods.....	per lb..	.2125	.2125	.1925
Solder (½ and ½).....	per lb..	.2975	.3025	.345
Cotton waste, white...	per lb..	.13	.13	.10@.13½
Disks, aluminum oxide mineral, cloth, No. 1. 6-in. dia.....	per 100.	4.59	4.59	3.59
Lard cutting oil.....	per gal.	.65	.65	.65
Machine oil.....	per gal.	.33	.33	.30
Belting, leather, medium.....	off list..	30–10%	30–10%	30–10%
Machine bolts, up to 1x30 in., full kegs...	off list..	50-10%*	50–10%*	50–10%*

*List prices as of April 1, 1927.

MISCELLANEOUS—Continued

	New York	Cleveland	Chicago
Abrasive materials — Standard grade, in sheets 9x11 in., No. 1, per ream of 480 sheets:			
Flint paper*.....	$6.03	$6.03	$6.03
Emery cloth*.....	25.87	25.87	25.87
Disks, aluminum oxide mineral, 6 in. dia., No. 1, per 100:			
Paper†.....	2.61	2.61	2.61
Cloth†.....	4.59	4.59	4.59
Fire clay, per 100 lb. bag.....	1.00	.75	.75
Coke, prompt furnace, per net ton.....	Connellsville, 2.50@2.60		
Coke, prompt foundry, per net ton.....	Connellsville, 3.50@4.85		
White lead, dry.....	100 lb. kegs ...	New York, 13.75	
White lead, in oil.....	100 lb kegs....	New York, 14.25	
Red lead, dry.....	100 lb. kegs....	New York, 13.75	
Red lead, in oil.....	100 lb. kegs....	New York, 15.25	

*Less than 3 reams. †Less than 200.

SHOP SUPPLIES

Discounts from new list dated Apr. 1, 1927, applying on immediate deliveries from warehouse stocks in New York and vicinity:

Machine bolts:	
Up to ¾-in. x 6-in., full kegs, list less.....	60%
Larger, up to 1 x 30-in., full kegs, list less.....	50–10%
Less than full kegs or case lots, add to list.....	10%
Fitting-up bolts: list less.....	45%
Lag screws:	
Up to ½-in. x 6-in., list less.....	60%
Larger, list less.....	50–10%
Less than full keg or case lots, add to list.....	10%
Rivets:	
Structural, round head, full kegs, net.....	$4.50
Structural, round head, broken kegs, net.....	6.00
Tank, 7/16-in. dia. and smaller, list less.....	60%
Nuts:	
Hot pressed, square or hexagonal, blank or tapped:	
Full kegs up to 1-in., incl., list less.....	60%
Larger, up to 3-in., list less.....	40–10%
Less than keg or case lots, add to list.....	10%
Washers:	
Wrought, full kegs, per 100 lb., list less.....	$4.00
Wrought, broken kegs, per 100 lb., list less.....	2.00
Turnbuckles:	
With stub ends, list less.....	20%
Without stub ends, list less.....	50%
Chain:	
Proof coil, base, per 100 lb., net.....	$7.10
Cast iron welding flux, per lb., net.....	.40
Brazing flux, per lb., net.....	.80

MACHINE REQUIREMENTS AND INDUSTRIAL CONSTRUCTION

Equipment Wanted

Calif., Richmond—Ford Motor Co., Dearborn, Mich.—cranes and conveyors for dock equipment, also conveyor system for proposed 1 and 2 story auto assembly plant here.

Ind., Indianapolis — American Foundry Co., 531 South Warman Ave.—machine shop equipment to replace fire loss. Estimated cost $500,000.

Mich., Dearborn—Bopp Steel Corp., 4-237 General Motors Bldg., Detroit—machinery and equipment for the manufacture of cold rolled steel for automobiles for proposed 1 story, 52 x 288 ft. steel factory on Maple Ave. here. Estimated cost $50,000.

Mich., Lincoln Park—Lincoln Park Tool Co., 1525 Candler Ave. (machinists and tool makers) —24 in. G. & E. shaper, and No. 11 Brown & Sharpe plain grinder.

Tex., El Paso—American Smelting & Refining Co., Equitable Bldg., 120 Broadway, New York, N. Y.—tentative plans for improvements including new machinery for handling minerals and metallurgy of ores and metals, new crushing machinery and equipment, improvements to sampling mill and installing Dross reverberatory furnace and sinter crushing plant, etc. Estimated cost $100,000.

Opportunities for Future Business

Calif., San Francisco—U. S. Government, will soon award contract for the construction of two 3 story shops and warehouse at Goat Island.

Conn., Manchester—O'Meara Motor Sales Co., 285 Connecticut Blvd., Hartford, had plans prepared for the construction of a 1 story, 75 x 125 ft. service building on Maple St., here. Estimated cost $40,000. O. H. Smith, 15 Brunswick Ave., West Hartford, Archt.

Conn., New Haven — Brock-Hall Dairy Co. Inc., 1204 Whitney Ave., is receiving bids for a 2 story, 70 x 115 ft. garage and repair shop. Estimated cost $60,000. R. W. Foote, 185 Church St., Archt.

Conn., New Haven—New Haven Gas Light Co., H. L. Sterrell, 80 Crown St., awarded contract for additions and alterations to machine, paint, service and meter repair shops, etc., on Chapel St. Estimated cost $80,000. Noted Feb. 6.

Conn., Shelton—O. K. Tool Co., Hull Ave., awarded contract for the construction of a 1 and 3 story, 80 x 180 and 25 x 40 ft. factory. Estimated cost $75,000.

Ill., Chicago—Packard Motor Car Co., A. Macauley, Grand Blvd., Detroit, Mich., is having plans prepared for the construction of a 3 story sales and service building at La Salle and Wells Sts., here. A. Kahn, Inc., 1000 Marquette Bldg., Detroit, Mich., Archt. and Engr.

Ill., Evanston—Bondurant Motor Sale, J. R. Bondurant, 1029 Davis St., is having plans prepared for the construction of a 1 story automoblie sales and service building on Ridge Ave. F. V. Prather, 400 North Michigan Ave., Chicago, Archt.

Ill., Peoria—Peoria Malleable Castings Co., L. E. Roby, Pres., Alexander St., plans the construction of a 3 story addition to factory. Estimated cost $30,00? L. E. Robinson, Inc., Jefferson Bldg., Archt.

Ind., Evansville—Bayard Tire Co., awarded contract for the construction of a 115 x 140 ft. machine shop and service station at 4th and Walnut Sts. Estimated cost $46,000.

Ind., Fort Wayne—City Carriage Co., 629-31 South Barr St., awarded contract for the construction of a factory at 514 East Wayne St. Estimated cost $47,000.

Ind., Fort Wayne—Texas Oil Co., awarded contract for the construction of a machine shop and service station at Wells and State Sts. Estimated cost $45,000.

Ind., Hammond—Beatty Machine Co., is receiving bids for the construction of a factory on 150th St. Estimated cost $46,000. H. Nilsson, Hammond, Archt.

Ind., Indianapolis—T. B. Thatcher, 327 East 38th St., awarded contract for the construction of a machine shop and service station at Superior and Sahm Sts. Estimated cost $41,200.

Ind., New Castle — Perfect Circle Piston, Hagerstown, plans addition to foundry. Estimated cost $50,000. Private plans.

Ind., Washington — Reliance Mfg. Co., B. Shields, will soon award contract for additions and alterations to factory on Van Treese St. Estimated cost $75,000. B. Clawson, 503 Pearl St., Archt.

Md., Baltimore—Argonaut Realty Corp., c/o A. Kahn, Inc., 1000 Marquette Bldg., Detroit, Mich., Engr., awarded contract for the construction of a 1 and 2 story, 113 x 280 ft. factory at Key Highway and Fort Ave. Noted Jan. 16.

Mass., Cambridge (Boston P. O.)—G. Kramer, 844 Main St., is having preliminary plans prepared for the construction of a 3 story garage at 1725 Massachusetts Ave. Estimated cost $200,000. Private plans.

Mass., New Bedford—National Service Building Trust, c/o W. A. Dykeman, 10 Devonshire St., Boston, Archt., had plans prepared for the construction of a 1 and 2 story, 80 x 240 ft. garage and repair shop at South Water and Walnut Sts., for New England Telegraph & Telephone Co., 50 Oliver St., Boston, lessee.

Mass., Walpole—Multibestos Co., G. Putnam, Pres., South St., awarded contract for the construction of a 2 story, 36 x 80 ft. addition to factory. Estimated cost $40,000.

Neb., Omaha—Garrett & Agor, Inc., 216 Lyric Bldg., awarded contract for the construction of a garage and office, at 15th and Harvey Sts. Estimated cost $800,000.

N. J., North Bergen—Theurer Wagon Works Inc., 601 West 56th St., New York, N. Y., will build a 3 story addition to factory at 3923-47 Hudson Blvd., here. Estimated cost $40,000. G. Urllaredt, 411 23rd St., West New York, Archt. Work will be done by separate contracts. Noted Feb. 6.

N. Y., Brooklyn—Connelly Construction Co., 32 Court St., will build a 1 story, 100 x 140 ft. garage at Ft. Hamilton Parkway and East 36th St. Estimated cost $50,000. W. F. Doyle, 12 John St., New York, Archt. Work will be done by separate contracts. Maturity May 1. Noted Feb. 6.

N. Y., Brooklyn — Parkway Center Building Corp., 350 Stone Ave., plans the construction of a 2 story, 92 x 177 ft. garage at East New York and Schenectady Aves. Estimated cost to exceed $60,000. H. M. Sushan, 367 Fulton St., Archt. Maturity about June 1. Noted Feb. 6.

N. Y., Brooklyn—J. Sklar, 133 Floyd St., will receive bids about May 1 for the construction of a 1 story, 100 x 120 ft. garage at East 98th St. and Winthrop Ave. Estimated cost $40,000. H. J. Nurick, 44 Court St., Archt.

N. Y., Elmhurst—J. Gerard, 80-15 45th Ave., is receiving bids for the construction of a 1 story, 141 x 180 ft. garage. Estimated cost $40,000. P. Coco, 433 Steinway Ave., Astoria, Archt. Noted Dec. 12.

N. Y., Flushing — Queens Development Co., 2154 84th St., Brooklyn, plans the construction of a service garage on Dahlia Ave. Estimated cost $500,000. Farber & Kalkin, 1746 Pitkin Ave., Brooklyn, archt. Work will be done by separate contracts.

N. Y., Olean—Olean Metal Cabinet Works, is having plans prepared for the construction of a factory. Estimated cost $350,000. A. W. E. Schoenbery, Olean, and O. Johnson, Jamestown, Archts.

N. Y., West New Brighton (sta. Staten Island)—Dept. of Water Supply, Gas & Electricity, Municipal Bldg., New York, will receive bids about Feb. 20 for the construction of a garage here. Sibley & Fetherstone, 205 East 42nd St., New York, Archts.

O., Akron—Palmer Match Co., J. L. Walker, Pres., Chamber of Commerce Bldg., Pittsburgh, Pa., will soon receive bids for additions and alterations to machine shop. Estimated cost $150,000. Hannah and Sterling, 209 9th St., Pittsburgh, Pa., Archt.

O., Cincinnati—Dreses Machine Tool Co., 2415 Spring Grove Ave., is having preliminary plans prepared for the construction of a 2 and 3 story foundry and office. Estimated cost $100,000. Private plans.

O., Cincinnati—Rich Pump & Ladder Co., 1300 Harrison Ave., is receiving bids for the construction of a factory. Estimated cost to exceed $100,000.

O., Cleveland — American Can Co., F. I. Truxal, Mgr., 1654 East 40th St., plans the construction of a factory. Estimated cost $2,500,000. Private plans.

O., Cleveland—Crucible Steel Castings Co., W. H. Shepard, Pres., West 84th St. and Almira Ave., awarded contract for a 1 story addition to pattern shop. Estimated cost $50,000. Noted Feb. 6.

O., Cleveland—The Kroehler Mfg. Co., Fisher Bldg., Chicago, Ill., manufacturers of furniture, is having plans prepared for a 3 story, 80 x 200 ft. addition to factory at East 116th St. and Harvard Ave. Estimated cost $200,000. J. O. Taylor, c/o Owner, Archt.

O., Philo—Ohio Ferro-Alloy Corp., Witters Bldg., Canton, plans the construction of a 1 story, 80 x 250 ft. factory here Estimated cost $50,000 to $75,000. Private plans.

Pa., Philadelphia—Philadelphia Electric Co., 10th and Chestnut Sts., plans the construction of a 4 story, 122 x 283 x 372 ft. warehouse and service building at 33rd and Thompson Sts. J. T. Windrim, Commonwealth Bldg., Archt.

South Carolina—State Highway Dept., B. M. Sawyer, Comr., will receive bids until Feb. 18, for the construction of standard maintenance shops consisting of repair and blacksmith shops, etc. at Conway and Dillon.

Pa., Gibsonton—Pittsburgh Steel Co., H. D. Williams, Union Trust Bldg., Pittsburgh, is having preliminary plans prepared for the construction of a by-products plant, here. Estimated cost $3,000,000. Private plans.

Pa., Harrisburg — Commonwealth of Pennsylvania, State Highway Dept., J. L. Stuart, Secy., Highway Bldg., will soon award contract for the construction of a 1 story garage, Herr St., near Patrol Barracks. Private plans.

Pa., Troy—Troy Engine & Machine Co., Broad and Chestnut Sts., Philadelphia, is having revised plans prepared for alterations and additions to factory, here. W. E. S. Dyer, Land Title Bldg., Philadelphia, Engr.

Tenn., Memphis — St. Louis-San Francisco Ry., St. Louis, Mo., plans the construction of a complete box car plant and locomotive shop at Yale yards here. Estimated cost $500,000. F. G. Jonah, St. Louis, Ch. Engr.

Tex., Cleburne—Gulf, Colorado, Santa Fe. Ry. Co., Galveston, awarded contract for improvements to shops including, 24 x 192 and 24 x 580 ft. warehouse, etc., here. F. Merritt, Galveston, Ch. Engr.

Tex., Prairie View—Prairie View College, will build a 2 story, 102 x 238 ft. industrial shop building. Estimated cost $200,000. F. E. Giesecke, College Station, Archt. Work will be done under the supervision of J. K. Walker.

Wis., Kenosha—Kenosha Development Co., J. Josephson, Pres., awarded contract for the construction of a 2 story, 125 x 164 ft. garage. Noted Nov. 28.

Wis., Milwaukee—General Bronze Co., 1665 Booth St., plans addition to foundry and fabrication mill. Estimated cost exceeds $100,000. Maturity late spring.

Ont., Toronto — Bd. Educ., 155 College St., plans construction of schools incl. manual training department in Withraw and Earl Beatty Schools. $136,000. C. E. Dyson, 155 College St., archt.

Que., St. Scholastique—Emile Forget, plans the construction of a garage and repair shop. Estimated cost $60,000.

Russia — Union Soviet Socialist Republic plan an industrial program involving expenditures of more than $10,000,000,000 during next five years as follows: 4 large plants for manufacture of automobiles, trucks and motorcycles; 8 factories for farm implements and tractors; 6 asbestos, and graphite factories; 15 factories for manufacture of machine tools, equipment, typewriters and cash registers; 2 locomotive works; 24 cement plants; 126 saw mills; 106 woodworking plants; 27 glass factories; 15 woolen mills; 13 clothing factories; 15 paper mills and 56 plants for manufacture of food products; 224,500 kw. power plants, etc. 1930 budget for new construction and improvements to existing plants $1,900,000. Albert Kahn, Inc., 1004 Marquette Bldg., Detroit, Mich., is consulting architect. Address Amtorg Trading Corp., 261 5th Ave., New York, N. Y.